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CONTENTS

**ABDOMINAL SURGERY**

Surgical Implications of the Connective Tissue Diseases ..... 285
*Milton G. Bohrod, M.D., D.A.B., Rochester, New York*

Artificial Bile Ducts in the Management of Congenital Biliary Artresia: A Clinical Report ..... 293
*Julian A. Sterling, M.D., Sc.D., F.A.C.S., Philadelphia, Pennsylvania*

Congenital Anomalies of Intestinal Rotation ..... 297
*Hall G. Holder, M.D., F.A.C.S., F.I.C.S., D.A.B., La Jolla, California*

Duplication of the Terminal Portion of the Ileum as a Cause of Intestinal Obstruction in Infants and Children ..... 300
*M. Solowiejczyk, M.D., F.I.C.S., H. Suprun, M.D., and P. Shereshewski, M.D., Tel Aviv, Israel*

**CARDIOVASCULAR SURGERY**

Direct Operations in the Treatment of Complications of Portal Hypertension ..... 308
*Norman C. Tanner, M.D., F.R.C.S., London, England*

**GENITOURINARY SURGERY**

The Diagnosis and Treatment of Carcinoma of the Prostate: Some Useful and Practical Suggestions ..... 315
*Lawrence P. Thackston, M.D., F.A.C.S., F.I.C.S., D.A.B., Neil C. Price, M.D., F.A.C.S., and Lawrence P. Thackston Jr., M.D., Orangeburg, South Carolina*

Electron Microscopic Studies of Stones of the Urinary Tract ..... 323
*Takeshi Minami, M.D., Tokyo, Japan*

**NEUROLOGIC SURGERY**

Hydatid Cysts of the Brain ..... 334
*Bulent Tarcan, M.D., F.I.C.S., Istanbul, Turkey*

**OPHTHALMOLOGIC SURGERY**

Refinements in Ophthalmic Surgery ..... 346
*Abraham Schlossman, M.D., F.A.C.S., D.A.B., New York City, New York*

**ORTHOPEDIC SURGERY**

Rehabilitation in Ceylon ..... 353
*J. Francis Silva, F.R.C.S., F.A.C.S., F.I.C.S., Colombo, Ceylon*

**OTORHINOLARYNGOLOGIC SURGERY**

Positional Nystagmus and Vertigo ..... 359
*Martin Spector, M.D., F.A.C.S., F.I.C.S., D.A.B., Philadelphia, Pennsylvania*

**PLASTIC AND RECONSTRUCTIVE SURGERY**

Planning the Integral Correction of the Human Profile ..... 364
*Mario Gonzalez-Ulloa, M.D., A.R.C.M., F.A.C.S., F.I.C.S., Mexico D.F., Mexico*

**TRAUMATIC SURGERY**

Emergency with Delayed Operation for Wounds of the Limbs ..... 374
*Marc Iselin, M.D., F.I.C.S., Paris, France*

**SECCION EN ESPANOL**

Aneurisma de la Carotida Interna ..... 377
*José Yoel, M.D., José Alberto Cerisola, M.D., and Bernardo Goldstein, M.D., Buenos Aires, Argentina*

Centros de Motricidad Pupilar en el Cerebro Visceral ..... 385
*Raúl Arturo Chavira, M.D., Guillermo Anguiamo L., M.D., Carlos Beyer F., M.D., and Flavio Mena J., M.D., Mexico D.F., Mexico*

**DEUTSCHE ABTEILUNG**

Referat eines Vortrages über Cytostatica, gehalten auf dem International College of Surgeons in Rotterdam ..... 391
*Gerhard Domagk, M.D., Wuppertal, Germany*

EDITORIALS

A National Emergency: Ways of Meeting the Physician Shortage ..... 395

I. The Nature of the Problem
*Ralph R. Coffey, M.D., F.A.C.S., F.I.C.S., D.A.B., Kansas City, Missouri*

II. The Profession and Its Critics
*Phil Cogley, M.D., F.A.C.S., F.I.C.S., Council Bluffs, Iowa*

III. The Family Doctor
*John S. DeTar, M.D., Milan, Michigan*

IV. The Cost
*Dominick F. Maurillo, A.B., M.D., LL.D., D.Sc., New York, New York*

V. The Possibilities
*Ralph Snyder, M.D., F.I.C.S. (Hon.), New York, New York*

An Appreciation of James Rudolph Jaeger, M.D., F.A.C.S., F.I.C.S. ..... 415
*D. J. LaFia, M.D., B.S., F.I.C.S., D.A.B., Philadelphia, Pennsylvania*

NEW BOOKS ..... 418

ABSTRACTS FROM CURRENT LITERATURE ..... 421

COLLEGE INTERNATIONAL DE CHIRURGIENS
FOUNDED BY DR. MAX THOREK

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## Abdominal Surgery

# Surgical Implications of the Connective Tissue Diseases

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THE idea of a collagen disease began just a short time ago (1942)[1] and was limited to the domain of the internist. But diseases which are widespread in the body sooner or later interest all branches of medicine. There is now considerable surgical importance in this group of lesions.

The limits of the "connective tissue diseases," more often called the "collagen diseases," have not been well demarcated. It would be useless, therefore, to attempt a rigid definition. It does seem, though, that the concept is becoming broader but less specific, and it is becoming less and less plausible to speak of a disease as either a collagen disease or not one. Just as one speaks of the allergic "components" of a disease,[2] so, perhaps, a large number of conditions, some of them very common, may have a "collagen disease component." Table 1 lists most of these as hereditary or acquired, local or general processes of various kinds. Before deciding that such an assemblage of seemingly diverse lesions cannot possibly have any family resem-

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*A sketchy survey has been made of the rapidly increasing number of conditions known as the connective tissue diseases or the collagen diseases.*

*More detailed attention was given to two diseases of especial surgical importance, polyarteritis nodosa and scleroderma. Special and variant forms of these are presented in tabular form.*

*Since surgical biopsy is a frequent means of making or confirming the diagnosis in this group of diseases, the issues involved in biopsy are discussed.*

blances, one should look at a chart in McKusick's book,[3] which shows how a defect in a single component of the connective tissues, in his example an elastic fiber, can end up in a wide variety of cutaneous, cardiovascular, ocular and skeletal disturbances.

The connective tissue diseases make up conditions in which widely different pathologic lesions result from changes either in connective tissue fibers or in interfibrillar spaces, in the latter case usually the deposit of substances on or between the fibers. The collagen and the elastic tissues of vascular structures are especially vulnerable. Because of the ubiquity of connective tissues and vessels in almost all tissues, the susceptibility of practically every organ is easy to understand, as is the frequency with which many structures, even many organ systems, show simultaneous or successive involvement.

It is hardly necessary to point out to the surgeon that he has an obvious interest in hernia and bone deformities such as occur in Marfan's syndrome and in others of the conditions listed in Table 1. I must regretfully limit the discussion here to the connective tissue diseases in the stricter view, the group indicated in the table as the *hyalinoses*, and to only the most important of these. The diseases in this group, like all the connective tissue diseases, share the same sites, the same pathogenetic loci. They have two other general properties in common. They share (1) general etiologic mechanisms and (2) pathogenic mechanisms. These two properties have a gray zone of intersection where they cannot always be told apart.

1. One must be careful to consider etiologic mechanisms, not single etiologic events or substances. Repeatedly, throughout this group, one encounters evidences of hypersensitivity, arteritis, hypergammaglobulinemia, cryoglobulinemia, plasmacytosis, fibrinoid degeneration, amyloidosis and other forms of hyalin.

TABLE 1.—*Classification of Connective Tissue Disease*

I. *Hyperplasia*
   1. Hereditary
      (a) Keloid
   2. Acquired
      (a) Senile elastosis

II. *Hypoplasia—deficiency*
   1. Hereditary
      (a) Marfan's syndrome
      (b) Ehlers-Denlos syndrome
   2. Acquired
      (a) Vitamin C deficiency
      (b) Excessive corticoids
      (c) Lathyrism (proprionitriles)
      (d) Other chemical substances (?)
      (e) Dissecting aneurysm (?)

III. *Hyalinoses—interstitial deposits*
   1. "Fibrinoid Degeneration"—"collagen disease" in common usage
      (a) Polyarteritis nodosa
      (b) Acute disseminated lupus erythematosus
      (c) Scleroderma
      (d) Dermatomyositis
      (e) Thrombotic thrombocytopenia
   2. Symptomatic "fibrinoid degeneration"
      (a) Rheumatic fever
      (b) Rheumatoid arthritis
      (c) Miscellaneous hypersensitivities
   3. Miscellaneous hyalin deposits
      (a) Amyloidosis (and paramyloidosis)
      (b) Diabetes mellitus
      (c) Hurler's syndrome

Some of these are no doubt related to each other or are the result one of the other. Hypersensitivity has been called "the only clue" to this group,[4] and some of the conditions, especially polyarteritis nodosa, have been reproduced by using hypersensitivity mechanisms.[5]

2. Clinical and pathologic features of this group often coexist in the same patient. This may result in uncertainty as to which disease name (label) to use for some patients, or in citing them as instances of the simultaneous occurrence of two or more of them. I have seen a patient who could fairly be said to have had acute disseminated lupus erythematosus, scleroderma, dermatomyositis and polyarteritis nodosa, and others have reported the same or similar combinations. This can mean only that the disturbances share pathogenetic mechanisms.

I have described the general pathologic picture of the hyalinoses elsewhere[6] and shall not detail them here.

*Biopsy in the Diagnosis of Connective Tissue Diseases.*—Biopsy is frequently used in the diagnosis of many collagen diseases, and in most institutions the surgeon is called upon to perform it. The value of the procedure depends in part on the surgeon's understanding of certain basic propositions.

Although the lesions of the connective diseases are disseminated, they are not diffuse or uniformly distributed. It is possible to miss them if only small bits of tissue are examined, and the chance of finding them increases with the volume of tissue examined. I attempt, therefore, to observe the following rules:

1. The biopsy specimen should always include skin *and* subcutaneous tissues *and* muscle.

2. The size of the pieces should be as large as is consistent with a good functional and cosmetic result.

3. The pathologist should embed all the tissue he receives and make step sections through all the blocks. I have found a single typical polyarteritis nodosa lesion in only one of sixteen slides made.

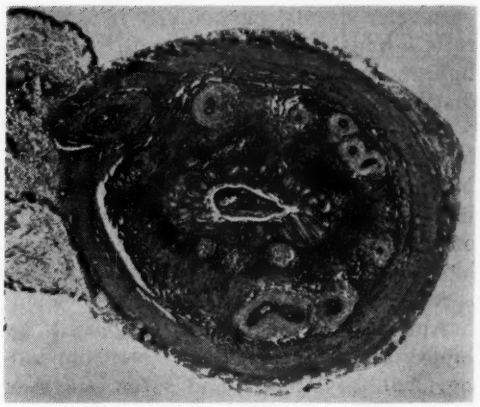

Fig. 1.—Appendix; polyarteritis nodosa. Every branch of blood vessels in submucosa is center of nodule of inflammation. Note larger nodule at root of mesoappendix.

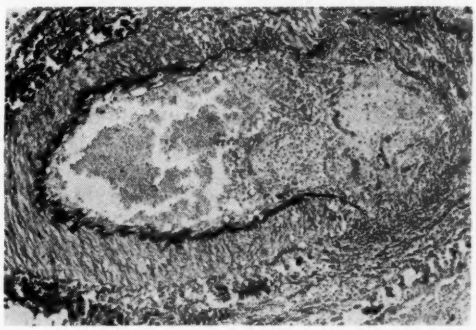

Fig. 2.—Colon; polyarteritis nodosa. Elastic tissue stain. Note destruction of elastic tissue at right, with beginning microaneurysm.

4. The diagnosis of a connective tissue disease may be made or confirmed by biopsy but *it can never be ruled out* in this way.

With these precautions, skin and muscle biopsies are worthwhile aids in diagnosis, although some workers deny this. In the institution I serve, 50 per cent of the cases of polyarteritis nodosa examined by biopsy disclose lesions that make or confirm the diagnosis. The results are even better

with scleroderma, particularly if the sclerotic lesions are examined with polarized light.[6a] In cases of dermatomyositis the diagnosis is nearly always made by biopsy.

The diagnosis of acute disseminated lupus erythematosus by skin or muscle biopsy is disappointing. The diagnosis has been made on needle puncture biopsy of the kidney. Fortunately the two-hour blood clot examination is available and is a reliable diagnostic aid.

Amyloidosis has been diagnosed by biopsy of the skin, tongue, liver and kidney, but far simpler and safer is a gum biopsy.[7] When hepatic involvement is pronounced, the liver becomes brittle and cracks upon needle puncture; fatal hemorrhage has occurred. One should therefore avoid needle biopsy of the liver when amyloidosis is suspected. Biopsy during laparotomy is not contraindicated, since complications, if any, can be cared for immediately. Sigmoidoscopic biopsy of the rectum is said to be used, but I have had no experience with it.

Thrombotic thrombocytopenia purpura could, I suppose, be diagnosed by biopsy, but the procedure is to be avoided because of the tendency toward bleeding.

*Polyarteritis Nodosa.*—Polyarteritis nodosa (periarteritis nodosa—Kussmaul and Maier) may affect the vessels of any organ in the body or any combination of organs. Lesions of isolated organs are very uncommon. They usually occur, however, in organs of vast surgical importance, the gallbladder and the appendix, and are usually removed for what seems to be banal gallgladder or appendical disease. Sometimes patients with lesions of the gallbladder later show evidence of disseminated disease, but appendical lesions are usually solitary. I have seen localized lesions in areas irradiated for carcinoma (cervix uteri, 3 times; breast, once). In all these cases of localized disease the individual lesions are identical with those in cases of dissemination. The disseminated type of disease I shall call classic polyarteritis nodosa, because of the lack of agreement as to whether it is the same or a different "arteritis" from hypersensitivity and other forms of arteritis (see discussions).[9]

Fig. 3.—Temporal arteritis. Lesion in this case, as in most, was bilateral.

Classic polyarteritis nodosa affects most frequently the coronary, renal, hepatic, cholecystic and mesenteric vessels, although, as has been stated, any vessel may be involved. The surgeon should be acquainted with the two last mentioned, because symptoms referable to the right upper abdominal quadrant, as well as abdominal crises, are common. On laparotomy, often required by good judgment in spite of the subsequent paucity of relevant observations, the only pathologic lesions may be nodules the size of a pinhead, or smaller, along the arteries beneath the serosa of the gallbaldder or in the mesentery. Instead of presenting as nodules, the lesions may be so close together that the vessel seems uniformly thickened and only the microscope discloses the nature of the process. Lesions causing infarction of the bowel and intestinal obstruction are uncommon, but such a one is here described in the case report here presented.

The lesions of polyarteritis nodosa have been produced by injecting large amounts of foreign proteins into a variety of animals, first by Rich.[5] It is supposed that similar antigen-antibody reactions are common among the ways in which the dis-

ease can be produced in man, but usually there is little or no indication of what the antigen may be. Specific infections have been shown to be responsible, especially those due to streptococci and tubercle bacilli.[10] The sulfonamides are among the more common drugs implicated, but the antibiotics are beginning to rival them. The following case* shows the relation with startling clarity:

A man 74 years old had been receiving Gantrisin for an infection of the urinary tract. For one week before admission to the hospital he had been weak and had had vomiting and diarrhea. Edema appeared on the backs of both hands. On the following day a hemorrhagic rash appeared over the ankles and petechiae on the abdomen. During the next week definite intestinal obstruction developed. With a suggested diagnosis of polyarteritis nodosa, operation was performed. A 35 cm. segment of small bowel was removed, the center of which was gangrenous. Histologic examination disclosed typical lesions of polyarteritis nodosa, some of them (Fig. 2) with microaneurysms. Recovery was good after a stormy course.

One month later evidence of the renal infection recurred. In the absence of his own physician, the patient was inadvertently given Gantrisin, 0.5 Gm. four times a day. The very next day the temperature rose to 102 F.; he had generalized pruritus, then a hemorrhagic rash and pain in one foot. The Gantrisin was immediately stopped and pyrabenzamine given, but the lesion of the foot went on to gangrene. Leukocytosis developed (15,000 leukocytes per cubic millimeter of blood), with eosinophilia (13 per cent eosinophils). The leg was amputated, and histologic examination showed lesions of polyarteritis nodosa.

*Temporal Arteritis.*—A number of special forms of angiitis more or less resemble polyarteritis nodosa; they are listed in Table 2. Surgically, the most important is temporal arteritis.

Classic polyarteritis nodosa has no characteristic predilection as to age or sex. In contrast, temporal arteritis occurs most commonly in elderly men. It is usually bilateral, and the patient seems much more ill than the visible indications seem to warrant. It usually ends in recovery, although symptoms may last for weeks or months. Arteries in the scalp other than the temporals are involved, and lesions of other cerebral vessels lead to severe headache and ocular symptoms. The surgeon's interest in this lesion stems from the practice of excising the visibly affected portions of the arteries on the supposition that this hastens recovery. I am not completely convinced that this is so; certainly there is no good control series. Excision is, however, a relatively benign procedure and does furnish the pathologist good histologic material.

TABLE 2.—*Special Forms of Angiitis*

| | |
|---|---|
| I. | *More or Less Disseminated Forms* |
| | 1. Acute<br>Hypersensitivity arteritis |
| | 2. Subacute and chronic<br>Classical polyarteritis nodosa |
| | 3. With granulomatosis<br>"Wegener's granuloma"<br>Malignant granuloma<br>Midline granuloma |
| | 4. Erythema nodosum |
| II. | *More or Less Localized Forms* |
| | 1. Local polyarteritis nodosa, esp. of appendix or gall bladder |
| | 2. Postirradiation |
| | 3. Temporal arteritis |
| | 4. Mammary angiitis (Mondor) |
| | 5. Salivary and lacrimal angiitis (Sjögren) |
| | 6. Rheumatoid arteritis |

TABLE 3.—*Special Forms of Scleroderma*

| | |
|---|---|
| 1. | Scleroderma of heart (interstitial fibrosis) |
| 2. | Scleroderma of lungs<br>Interstitial fibrosing pneumonitis (Hamman-Rich)<br>Pneumosclerosis compacta<br>Pneumosclerosis cystica (acquired pulmonary cysts) |
| 3. | Scleroderma of esophagus<br>Fibrosis and ulceration of esophagus |
| 4. | Scleroderma of bowel<br>Fibrosis of small and large intestine |
| 5. | Scleroderma with Sjögren's syndrome |
| 6. | Scleroderma with calcinosis<br>Thibierge-Weissenbach syndrome |
| 7. | Scleroderma arthropathy |
| 8. | Scleroderma with ochronosis |

*This case will be reported in full by Dr. George Bodon and myself.

*Scleroderma.*—The cutaneous manifestations of both localized (morphea) and generalized scleroderma have long been known, and visceral lesions have been described in cases of the latter as "complications." It is becoming clear, however, that the visceral lesions are an integral part of the disease.[11] They may be more impressive than the skin manifestations or may even dominate the clinical picture, an idea which is reflected in the alternate name *progressive systemic sclerosis.*[12] Recently the idea has come to be accepted that visceral forms may exist apart from the cutaneous lesions and may explain conditions for which the terms "primary" or "idiopathic" have served to shield professional ignorance. As a result, a number of special forms of scleroderma are recognized, the most important of which are listed in Table 3. All of these may follow or precede cutaneous lesions or may exist independent of them.

The surgeon is especially interested in gastrointestinal lesions.[13] Fibrosing lesions of the esophagus, with or without ulceration, are the commonest of these. The stomach is rarely involved. Lesions of the small intestine are common; lesions of the large bowel, much less so. Symptoms and signs of intestinal obstruction, frequently chronic or recurrent, are common manifestations, but acute episodes may require operation—ileostomy, colostomy or resection. Chronic constipation and other clinical and roentgen changes in motility or tone are to be seen. There is no mechanical obstruction, and even the fibrosis does not produce mechanical narrowing. The fibrosis is submucous and subserous and tends to replace the muscularis, especially the external circular muscle layer. Fibrosis is prominent in the intrinsic neural apparatus, gradually replacing ganglion cells and nerve trunks. This leads to changes in motility and bowel tone and is probably responsible for the failure of the bowel to respond to drugs or other stimuli.[14]

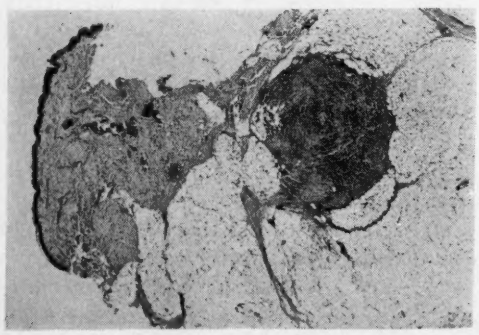

Fig. 4.—Mammary angiitis (Mondor).

The connective tissue in the wall of the bowel shows the same changes as does that in the skin.[6a] The fibers are broader and straighter than normal and are much more anisotropic in polarized light (Fig. 5).

In a large number of cases of scleroderma Raynaud's phenomenon is exhibited, and there may be roentgen evidence of trophic bone absorption in the fingers and toes. Calcinosis is common, either preceding other evidences of the disease or occurring late in its course.

The appearance of a patient with full-blown scleroderma is striking. The face is rigid, with few wrinkles in the forehead. The cheek bones are high, tight and shiny, with lazily drooping eyes (Holbein facies).[2] There are tiny radiating wrinkles about the corners of the mouth. The hands lie semiflexed, in the favorite position of the sufferer from Parkinson's disease but without the tremor. The general appearance may be of great help in diagnosis.

*Surgical Implications of Steroid Therapy.*—To the items aforementioned as shared by the connective tissue diseases there is an important one to add, namely, the favorable reaction to steroid therapy. There may be some doubt as to whether these substances have ever completely and permanently cured, but they certainly have the ability to relieve acute crises and to prolong life for many years. It would be

remarkable if such potent substances were entirely harmless; indeed, complications are well known, and some of them are important to surgeons.

Experiments on animals have demonstrated the ability of steroids to disrupt wounds and to prolong or interfere with wound healing. It is very doubtful whether this occurs in the human patient with the doses ordinarily employed. With prolonged use telangiectasis develops in the skin, and this may be accompanied by increased fragility of the collagen, local hemosiderosis and atrophic scarring.

In the local lesion of any of the collagen diseases the action of steroids is mainly on the inflammatory component and not at all on the necrotizing component. It follows, therefore, that relief from the general symptoms may be striking, while the incidence of ruptured necrotizing lesions, especially in cases of polyarteritis nodosa, is just as great as ever.

The effect of steroids on patients with a history of peptic ulcer is well known. I have observed several deaths from massive hemorrhage in such persons. Anatomically, the hemorrhage was in general the same as those observed in patients managed without steroid therapy,[15] except that the ulcers seemed more acute and the necrotizing element much more severe. Scars of previous ulcers are usually present. It is likely that in cases in which there is a very old history of ulcer there is no reactivation of the old ulcer but a rapid conversion to new hemorrhagic erosion into a peptic ulcer.

Prolonged use of steroids tends to reduce the function of the adrenal glands or the hypophysis or both. The development of new and safer steroids will increase the period over which they can be used. This may have consequences not yet known. One of my patients with scleroderma has died with an adenoma of the hypophysis. This may have nothing to do with the steroid therapy used, but the incidence of such phenomena must be watched. Finally, there may be other and still unknown consequences of steroid therapy. Complications, known and unknown, do not contraindicate the use of potent substances, but they do require positive indications and the avoidance of indiscriminate use.

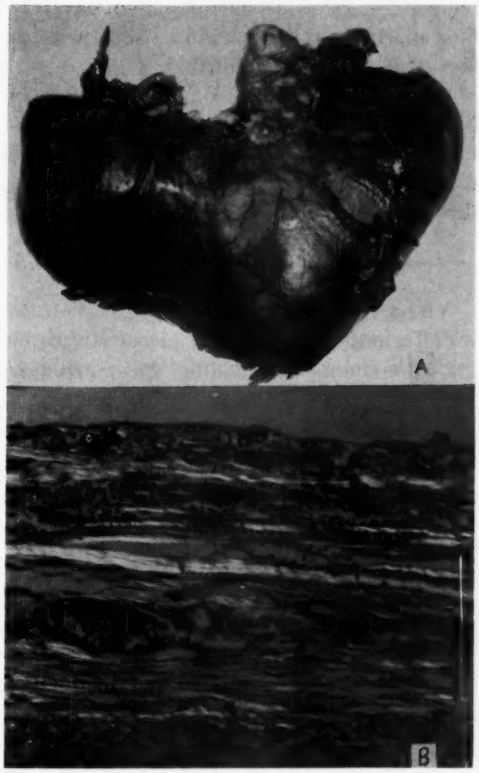


Fig. 5.—Colon; scleroderma. *A*, resected dilated portion. *B*, section in polarized light. Replacement of outer muscularis and subserosa by thick, straight, highly double-refractile collagen fibers.

RÉSUMÉ

L'auteur expose une brève étude du nombre de cas en augmentation rapide connus sous le nom d'affections du tissu conjonctif ou d'affections collagènes.

Deux affections revêtant une importance chirurgicale particulière sont étudiées de façon plus approfondie: la polyarthrite

noueuse et la sclérodermie, dont des formes spéciales et des variantes sont présentées sous forme de tableau.

Du fait que l'on recourt souvent à la biopsie chirurgicale pour poser ou confirmer le diagnostic dans cette catégorie d'affections, les résultats de la biopsie sont discutés.

RIASSUNTO

Viene fattauna rapida rassegna di tutte le affezioni che vengono descritte come malattie del tessuto connettivo o collagenopatie.

In particolare ne vengono trattate due, specialmente importanti dal punto di vista chirurgico: la poliarterite nodosa e lo scleroderma, con tutte le loro varieta'.

La biopsia rappresenta il mezzo piu' frequente e importante per fare la diagnosi di tali malattie o per confermarla; viene, pertanto, discusso l'interessamento dei vari tessuti accessibili alla biopsia.

RESUMEN

El autor presenta una relación sucinta de las dolencias que, cada vez en mayor número, se encuadran dentro del grupo conocido como enfermedades del colágeno o enfermedades del sistema connectivo, haciendo hincapié en las de mayor importancia quirúrgica, esto es, la periarteritis nudosa y la esclerodermia, haciendo una clasificación de sus formas clínicas.

Puesto que la confirmación del diagnóstico se hace mediante la biopsia, se discuten los hallazgos posibles de la misma.

ZUSAMMENFASSUNG

E liegt ein skizzenhafter Überblick über die rapide anwachsende Zahl von Erkrankungen vor, die als Bindegewebskrankheiten oder Kollagenkrankheiten bekannt sind. Auf zwei dieser Zustände, die von besonderer chirurgischer Wichtigkeit sind, wird näher eingegangen, nämlich auf die Polyarteriitis nodosa und auf das Skleroderm. Verschiedene und ungewöhnliche Formen dieser beiden Erkrankungen werden tabellarisch dargestellt.

Da bei dieser Krankheitsgruppe die Diagnose häufig durch die chirurgische Probeexzision gestellt oder bestätigt wird, werden die mit diesem Untersuchungsverfahren verbundenen Probleme erörtert.

REFERENCES

1. Klemperer, P.; Pollack, A. D., and Baehr, G.: Diffuse Collagen Disease, J.A.M.A. 119:331, 1942.
2. Bohrod, M. G.: Pathologic Manifestations of Allergic and Related Mechanisms in Diseases of the Lung, Int. Arch. Allergy 13:39-60, 1958.
3. McKusick, V. A.: Heritable Disorders of Connective Tissue. Second Edition, 1960. St. Louis: The C. V. Mosby Co., 1960. (Table is Fig. 44, p. 119).
4. Criep, L. H.: The Allergist's Stake in Collagen Diseases, J. Allergy 28:328-345, 1957.
5. Rich, A. R., and Gregory, J. E.: Experimental Demonstration that Periarteritis Nodosa Is Manifestation of Hypersensitivity, Bull. Johns Hopkins Hosp. 72:65, 1943.
6. Bohrod, M. G.: (a) Pathology of Allergic and Collagen Disease. In Prigal, S. J.: Fundamentals of Modern Allergy. New York: McGraw-Hill Book Co., 1960, chap. 10. (b) Bohrod.[2]
7. Rukavina, J. G., and others: Primary Systemic Amyloidosis, Medicine 35:239-334, 1956, esp. pp. 269-271.
8. Zeek, P. M.: Periarteritis Nodosa: A Critical Review, Am. J. Clin. Path. 22:770-790, 1952.
9. Bohrod, M. G.: Periarteritis Nodosa in an American Deer, Arch. Path. 62:17-22, 1956. Bohrod.[2] Zeek.[8]
10. Bohrod, M. G.: Periarteritis Nodosa-like Lesions in Tuberculous Meningitis, New York State J. Med. 48:275-276, 1948.
11. Rossier, P. H., and Hegglin-Volkmann, M.: Die Sklerodermie als internmedizinisches Problem, Schweiz. Med. Wchnschr. 89:1161-1167, 1954.
12. Rodnan, G. P.; Schreiner, G. E., and Black, R. L.: Renal Involvements in Progressive Systemic Sclerosis (Generalized Scleroderma), Am. J. Med. 23:445-462, 1957.
13. Goldgraber, M. B., and Kirsner, J. B.: Scleroderma of the Gastrointestinal Tract, Arch. Path. 64:225-265, 1957.
14. Arcilla, R.; Bandler, M.; Farber, M., and Olivar, A.: Gastrointestinal Scleroderma Simulating Chronic and Acute Intestinal Obstruction, Gastroenterol. 31:764-772, 1956.
15. Bohrod, M. G.: Pathologic Anatomy of Massive Hemorrhage in Peptic Ulcer With a Consideration of the Therapeutic Moral, Am. J. Gastroenterol. 25:109-115, 1956.

# Artificial Bile Ducts in the Management of Congenital Biliary Atresia: A Clinical Report

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*The results obtained by implantation of prosthetic bile ducts into the livers of 51 infants with congenital biliary atresia are described. The author lists the types of prostheses employed and explains the details of the implantation technic.*

ARTIFICIAL bile ducts have been used in the cases of 51 infants with congenital biliary atresia between April 1956 and September 1960.[1] Of these, 20, or 40 per cent, have survived for periods varying from three months to more than three years. The prosthetic bile ducts employed during these four years include *(a)* the original silver Southey tube;[2] *(b)* modifications of this tube by an increase to 5 and 7 cm. in length and to 2 and 3 mm. in diameter; *(c)* silver tubes as described in *(b)* plasticized by a coating of Teflon, and *(d)* several varieties of a plastic "biliary tree"[3] with 4 to 6 branches originating from the major trunk.

The gallbladder and the common bile duct may be patent in babies with atresia of the biliary ducts as Streeter[4] had indicated, since the gallbladder is formed from an anlage different from that which forms the hepatic parenchyma. The hepatic epithelium retains an ability to differentiate into the various components of the liver; for example, the basic embryonal hepatic cell has been demonstrated by Streeter[4] to be capable of forming hepatic duct or bile duct epithelium (parenchymatous tissue and canaliculi).

Recently, Sir Roy Cameron[5] determined that the damaged liver tissue associated with biliary atresia is able to return to normal after surgical anastomosis between a dilated functioning duct and bowel. Return to histologically normal liver has also been observed in areas of the hepatic parenchyma that are drained by use of artificial bile ducts.

*Operative Procedure.*—Four operative procedures were used for the introduction of artificial bile ducts into babies with congenital biliary atresia.

1. Creation of an external fistula.[6]
2. Creation of a liver-to-gallbladder fistula. In these, the gallbladder communicated, by means of an intact cystic and common duct, with the duodenum (Fig. 1).
3. Creation of a fistula from the liver to the small bowel (Fig. 2).
4. Creation of a liver-to-stomach fistula (Fig. 3).

*Results (see table).*—Four of the 7 babies with external fistula[5] died within eleven days after the operation. The other 3 survived for six to twenty-four months.

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*Results in December 1960, Three Months to Four Years After Operation*

| *Procedure* | *Number* | *Alive* | *Died* | *Mortality, %* |
|---|---|---|---|---|
| External fistula | 7 | 0 | 7 | 100 |
| Gallbladder fistula | 4 | 2 | 2 | 50 |
| Intestinal loop (pouch) | 17 | 6 | 11 | 65 |
| Intestinal limb (Roux en Y) | 5 | 3 | 2 | 40 |
| Stomach | 18 | 9 | 9 | 50 |
| Total | 51 | 20 | 31 | 60 |

Bile drainage did not continue after two to four months in 2 of these infants.

Two of 4 babies in whom a gallbladder-liver fistula was established died within two months after the operation. The other 2 have survived, at the time of writing, for eleven to forty months. Bile was present in every one of these babies' bowel movements and has persisted in those of the 2 who are still alive.

On 17 babies an intestinal pouch served as a hepatoenteric fistula. Bile is present in the stools in 3 of the 6 babies who are still alive (fifteen to twenty months). In babies who did not survive the operation (six hours to eight months), bile in the intestinal content was present in 6, intermittent in 3 and absent in 2.

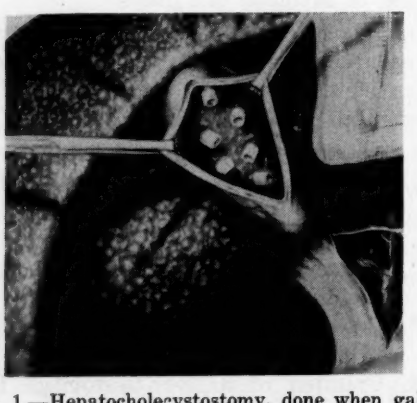

Fig. 1.—Hepatocholecystostomy, done when gallbladder communicates through intact cystic and common ducts with duodenum. In this case, gallbladder having been opened, six silver tubes were placed to communicate with hepatic parenchyma. Peritoneal reflection overlying common bile duct has been opened to visualize atretic cords of hepatic ducts.

In 5 babies a "Roux en Y" hepatoenteric fistula was established. Two with bile survived seven and fifteen months, respectively. Three babies died within five days after the operation; bile was present in the intestinal tract of 1. One died six months after the operation at the age of eighteen months, without bile in the intestinal tract.

In 18 babies a gastrohepatic fistula was established. Nine survived from four to fourteen months. Bile was present intermittently in the stools of 1 baby; it was present almost constantly in those of the others. Nine babies in this series died between ten hours and three months after the operation. Bile was noted in the bowel stools of 5 of the 9.

Of the 51 patients, 20 have survived for periods ranging from four to forty months. Seventeen of the 20 survivors have bile in the intestinal tract.

The appearance of bile in the intestinal tract was not constant.

## COMMENT

Artificial bile ducts were used in the cases of 51 infants between April 1956 and September 1960, in an attempt to establish a biliary fistula. These infants underwent a variety of operative procedures and showed kaleidoscopic hepatic defects. Their ages ranged from 3½ months to 3 years.

As a result of a study of the 51 babies, a definite procedure is now recommended, based upon safety in the insertion of the tubes, efficiency in the drainage of hepatic parenchyma and the desire to avoid damage to any small residual and hidden bile ducts that may be draining such segments of the liver as the caudate lobe.

The value of the use of artificial bile ducts depends upon: (1) the accuracy of the histologic diagnosis; (2) recognition of extrahepatic biliary ducts (dissection and cholangiogram); (3) the extent of change within the hepatic parenchyma, and (4) the ability of the liver cells to return to normal.

The livers of infants with biliary atresia are hobnailed. The cut section shows multiple tawny nodules. There are occasional segments of normal liver, and some of these are beneath the hepatic capsule. A wedge biopsy, therefore, may not give adequate information; a needle biopsy is preferred. Microscopically there are areas of fibrosis and of hepatic disorganization. Under high power, fibrosis and disorganization are observable in the portal triad; bile ducts of significant caliber cannot be seen. Under higher power, stasis is apparent within the cells and in some of the bile canaliculi. In other sections there may be bile duct proliferation, in many instances without bile.

Anatomic diagnosis depends upon meticulous dissection, informative cholecystocholangiographic study and the identification of fluid in the biliary tract.

As a rule, a baby with atresia of the biliary ducts does not survive beyond a period varying from six months to a year. Rarely, such an infant may survive for five or ten years or longer.

The serum bilirubin levels in this series were not as high as might have been expected. Since no bile at all has passed into the intestinal tract, one would expect these levels to be astronomic. In actual fact they are usually no higher than 15 mg. per hundred cubic centimeters. The direct bilirubin level in this series was between 10 and 12 mg. It was noted that, after placement of the artificial bile duct, the serum bilirubin content increased and remained elevated for several weeks, after which it subsided.

Fig. 2.—Enterohepatic fistula established over nine silver tubes. Jejunal pouch has been fixed to liver. Jejunojejunostomy is made beneath mesocolon.

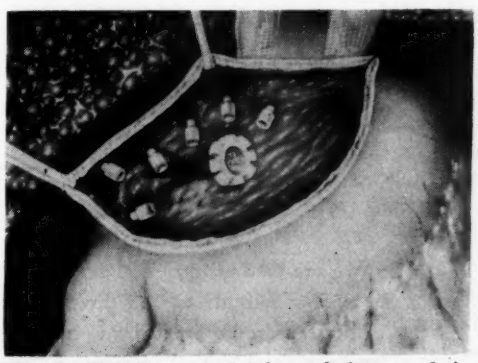

Fig. 3.—Hepatogastric fistula made by use of six silver tubes and one plastic biliary tree.

The following procedure is recommended for babies with atresia of the hepatic duct (biliary atresia):

1. Establish the diagnosis, anatomically, roentgenographically and histologically.

2. Perform gastrohepatostomy, using silver cannulas and a plastic tree with artificial bile ducts. Cholecystohepatostomy can be performed with the prostheses in use.

Since the hepatic and other changes are progressive, operation should be performed as soon as the diagnosis is established.

RIASSUNTO

In 51 casi di atresia delle vie biliari extraepatiche vennero messi nel fegato dei dotti biliari artificiali (Aprile 1956-Settembre 1960). In 20 si ebbero delle sopravvivenze da 3 mesi a 3 anni, e in 17 di tali bambini si osservo' la presenza di bile nel tratto intestinale.

SUMARIO

Em 51 crianças com atresia do dúto biliar, foram êstes substituidos por outros artificiais, no figado (Abril 1.956 e Setembro 1.960). Vinte crianças sobreviveram por periodos variando de 3 mêses a mais de 3 ânos. Em 17 dêstes, observou-se bile no tráto intestinal.

RÉSUMÉ

Des cholédoques artificiels ont été placés dans le foie de 51 nourrissons atteints d'atrésie du canal biliaire (avril 1956 à septembre 1960). L'auteur a constaté des périodes de survie variant de 3 mois à plus de trois ans chez 21 nourrissons; chez 17 d'entre eux, de la bile a été observée dans le tractus intestinal.

ZUSAMMENFASSUNG

Von April 1956 bis September 1960 wurden bei 51 Kleinkindern mit Gallengangsverschluss künstliche Gallenwege in die Leber eingesetzt. Zwanzig Babys haben die Operation drei Monate bis mehr als drei Jahre überlebt, und bei 17 von diesen wurde Galle im Darmkanal beobachtet.

REFERENCES

1. Sterling, J. A.: Artificial Bile Ducts in Congenital Biliary Atresia, J. Einstein Med. Center 8:314-315 (Oct.) 1960.

2. Southey, R. S.: Chronic Parenchymatous Nephritis of Right Kidney. Left Kidney Small and Atrophic; Old Scrofulous Pyelitis, Tr. Clin. Soc. London 10:152-157, 1877.

3. Sterling, J. A.: An Artificial Biliary Tree for Use in Biliary Agenesis, J. Einstein Med. Center 8:218-220 (July) 1960.

4. Streeter, G. L.: Developmental Horizons in Human Embryos, Age Groups XI to XXIII, Carnegie Institution of Washington, 1951.

5. Cameron, R.: Congenital Biliary Atresia, Brit. M. J. 2:1253-1257 (Oct. 29) 1960.

6. Sterling, J. A.: Experiences with Congenital Biliary Atresia, Springfield: Charles C Thomas, Publisher, 1960.

We are the creatures of imagination, passion and self-will, more than of reason, or even of self-interest . . . Even in the common transactions and daily intercourse of life, we are governed by whim, caprice, prejudice or accident. The falling of a teacup puts us out of temper for the day; and a quarrel that commenced about the pattern of a gown many end only with our lives.

—*Hazlitt*

# Congenital Anomalies of Intestinal Rotation

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CONGENITAL anomalies of intestinal rotation may produce symptoms of chronic or acute intestinal obstruction at any age. Most infants with this condition present symptoms during the first two weeks of life.

Adults with rotational disorders are generally divided into three groups: First, those with chronic or intermittent symptoms since childhood treated only after maturity; second, those with no previous history of distress or with chronic abdominal complaints is whom severe complications and symptoms of intestinal obstruction develop. The diagnosis in these cases is difficult and usually cannot be made prior to an acute attack unless a gastrointestinal series or a barium enema demonstrates the abnormal distribution of the large and small bowel.

There are three stages of rotation of the intestinal tract. The first occurs while the midgut loop occupies the umbilical stalk. During this time the loop becomes elongated and rotates counterclockwise 180 degrees on the axis of the superior mesenteric vessels. The second stage comprises the return of the midgut to the peritoneal cavity with further rotation of 90 degrees. The ultimate position at the end of this phase is a total counterclockwise rotation of 270 degrees from the sagittal plane. During the third stage the duodenum, the mesentery and the descending portion of the colon become fixed to the posterior abdominal wall, the cecum occupying the postnatal position in the right lower quadrant.

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*The numerous case reports on bizarre intraperitoneal relations, except for those in which the herniation of viscera through peritoneal and omental defects, or the presence of abnormal bands producing obstruction, represents alterations in normal intestinal rotation and fixation. Anomalies of intestinal rotation in man can be demonstrated by experiments on the feline intestinal tract.*

*A logical approach to therapy is outlined.*

The cat family has a mesenteric alimentary canal from the thoracic diaphragm to the pelvic diaphragm. The viscera of the cat are, in their general proportions, similar to those of man. The viscera of the cat can therefore lie in any position in the abdominal cavity allowed by the length of the mesentery. The abnormal positions of human viscera can therefore readily be duplicated in this animal. I have presented a motion picture demonstration of this subject on a cougar in cooperation with the Research Hospital of the San Diego Zoo.

*Normal Rotation.*—To demonstrate normal rotation of the human gastrointestinal tract, all of the small bowel of the cat is grasped in the left hand, palm downward and fingers toward the thorax. As the hand is turned over or supinated, the intestinal tract will be rotated about the superior mesenteric vessels as an axis. The duodenum will pass behind these vessels

transversely, and the large bowel will cross in front of them. It should be readily apparent that this rotation could be arrested at any point, producing the next category, malrotation or incomplete rotation. The significant point is that the intestinal tract turns counterclockwise about the superior mesenteric vessels as the surgeon faces them. Obviously the greatest movement occurs at the extreme end, the duodenum and the cecum.

*Incomplete Rotation or Malrotation.*—In this category there may be an extrinsic block to the terminal portion of the duodenum, caused by congenital bands. Also, because of the failure of posterior fixation of the mesentery, there may be volvulus of all or part of the bowel arising from the midgut about the superior mesenteric vessels.

Obviously there are many intestinal patterns that are intermediate between complete nonrotation and normal postnatal rotation. Some of these are incomplete rotation; others consist of rotation into abnormal positions. It is evident that the possible anomalies in this group are almost unlimited. Normal posterior mesenteric fixation does not occur. Abnormal congenital bands are frequently present. These may lead to kinking and obstruction or volvulus.

*Nonrotation.*—In nonrotation the colon is arranged on the left side of the peritoneal cavity, while the duodenum comes down vertically from the stomach to lie parallel and to the right of the superior mesenteric vessels. The entire small intestinal mass lies on the right side of the peritoneal cavity. The terminal portion of the ileum enters the colon from right to left. In the large bowel it is often difficult to distinguish the hepatic and splenic flexures, since the entire mass is folded upon itself and lies on the left side of the peritoneal cavity. The duodenum may be fixed or free.

*Reverse Rotation.*—Reverse rotation is a rare anomaly in which the midgut rotates in the opposite, or clockwise, direction 90 degrees from the primary site or position. The transverse portion of the colon takes its position behind the superior mesenteric artery and the duodenum. The jejunum also crosses anteriorly, and as its mesentery becomes fixed the right transverse portion of the colon is enclosed in a tunnel. The development of obstruction at this point depends upon the tightness of the jejunal mesentery. In this anomaly the cecum and ascending colon frequently are not fixed by the mesentery to the posterior abdominal wall. Obviously, in reverse rotation the colon cannot be placed in a normal position. This may be demonstrated on the cat by grasping all of the small intestinal mass in the right hand, the fingers toward the thorax. By supinating the right hand one will place the cecum behind the mass of small intestine and its mesentery and will have rotated the duodenum over the top of the superior mesenteric vessels. Here again the superior mesenteric vessels act as the axis of rotation.

*Internal Hernia.*—It is now assumed that most internal hernias or concealed umbilical hernia are the result of malrotation. Actual hernia of the intestine through a defect in the mesentery or through normal or abnormal orifices in the parietes should be excluded from this category. Concealed umbilical hernia, as reconstructed by Papez, represents a persistence of the peritoneal sac that earlier extended into the umbilical stalk at the sixth week of development. An infant born with an omphalocele illustrates the non-return of this sac. Because of the adhesions of the duodenum to this embryonic peritoneal sac, the sac and its contents can be stripped out of the umbilical stalk as a unit and returned to the abdominal cavity. When this condition is

observed at laparotomy, if the sac appears on the left side of the peritoneal cavity encasing the small intestinal tract, normal rotation has occurred. When the sac appears on the right side, nonrotation of the intestinal tract has taken place. Always associated with this anomaly are numerous adhesions of the sac to the duodenum and the first portion of the jejunum.

*Surgical Therapy.*—In the surgical treatment of these conditions I prefer a transverse laparotomy incision after adequate preparation of the patient. Wide exposure of the entire gastrointestinal tract allows evisceration of the small bowel and facilitates detorsion if this is necessary. Important landmarks for orientation are the stomach, the proximal portion of the duodenum and the splenic flexure of the colon, which are usually normally situated. It is important to investigate the entire intestinal tract, from the duodenum to the lower segments of the sigmoid flexure, dividing obstructing bands and removing compromised or divitalized intestine. In cases of reverse rotation left colectomy may be necessary, with reestablishment of the continuity of the gastrointestinal tract and end-to-end ileocolostomy distal to the point of obstruction. Bypass by side-to-side ileotransverse colostomy may be feasible if the blood supply to the right half of the colon has not been compromised and if this procedure provides adequate drainage of the closed loop obstruction in the right half of the colon. In cases of concealed umbilical hernia it is important to emphasize the fact that relief of the obstruction should always be approached from the distal end of the sac, that is, where the terminal portion of the ileum emerges.

RÉSUMÉ

Sauf pour la hernie viscérale due à des affections péritonéales et épiploïques, les nombreux cas rapportés dans littérature ayant trait à des relations intrapéritonéales inhabituelles des viscères à des stries péritonéales anormales produisant une obstruction, décrivent des altérations de la rotation et de la fixation intestinale normales.

Le fait qu'il se produit effectivement des anomalies de la rotation intestinale est illustré par des études sur le tractus intestinal du chat. Une voie d'accès chirurgicale logique est décrite.

RIASSUNTO

Eccettuati i casi di ernia vera dei visceri attraverso forami peritoneali o omentali, tutti gli altri casi di ostruzione attribuiti ad anormali relazioni fra i visceri e bande o briglie peritoneali sono invece da considerare come dovuti a defetti di rotazione e fissazione dell'intestino.

La frequenza delle anomalie nella rotazione intestinale e' provata dagli studi sul tratto intestinale dei felini. Viene indicato un metodo di terapia chirurgica.

SUMARIO

Com exceção feita para herniação de visceras através de defeitos peritoniais e omentais, os numerosos casos relatados dizendo respeito a relações bizarras intraperitoniais das visceras e tiras anormais produzindo obstrução, representam alterações na rotação e fixação intestinal normal.

O fáto de ocorrerem anomalias da rotação intestinal é ilustrado por estudos do tráto intestinal felino. Descreve um método lógico de terapêutica cirurgica.

# Duplication of the Terminal Portion of the Ileum as a Cause of Intestinal Obstruction in Infants and Children

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AND
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IN DAILY treatment of "acute abdomen" in the newborn and children one is confronted with difficult problems in diagnosis. If the right lower abdominal quadrant is involved one is inclined to think of appendicitis or intussusception, since these are most frequently encountered.

Our intention in this paper is to emphasize another etiologic factor that is seldom thought of. This clinical entity is acute obstruction of the small intestine in infants and children caused by duplication of the ileum. In most cases the diagnosis is accidentally made under direct vision during a laparotomy or discovered at autopsy. Duplication of the alimentary tract is a rare congenital anomaly,[1] but not as rare as had been assumed until 1940.[2] Potter[3] encountered duplication of the alimentary tract twice in more than 9,000 fetal and neonatal necropsies.

As to the incidence of intestinal obstruction caused by duplication of the terminal portion of the ileum and ileocecal valve, it is noteworthy to mention that the latter obstructive factor (contained in the terminal portion of the ileum) is rare.

The earliest description of a duplication of the terminal ileum, which caused intestinal obstruction and the death of an infant 11 days old, was made by Fraenkel (cited by Moore and Battersby[4]) in a necropsy report published in 1882.

Reginald Fitz[4] in 1884 probably employed the term "duplication" for the first time, but since then, because of great variety in localization and the lack of an adequately satisfactory embryogenetic theory, we have found reported terms in the literature, e.g., "enteric cyst," "enterogenous cyst," "ileum duplex," "giant diverticula" and "reduplication."

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*The author presents a new method of obliterating the saphenous veins, which in his hands has given excellent results. It eliminates the need of distal injection during ligation and insures that no sclerosing solution will be spilled into the wound; it also permits resection of a longer segment of the vein than usual. The end result is complete obliteration of the veins without injection.*

As all these malformations have similar histologic structures, Ladd and Gross[5] in 1939 suggested classification of all cystic lesions at various levels of the alimentary tract under the term "duplications of the alimentary tract."

Duplication is most common along the ileum and in the ileocecal region; the next most common location is within the thoracic cage or within the colon and rectum. The remainder occur in the jejunum, the duodenum and the stomach. The duplications present themselves in two forms, spherical and tubular.

The spherical duplications occur most frequently in the terminal portion of the ileum, near the ileocecal juncture. The larger ones generally cause intestinal obstruction; the smaller ones tend more to act as leading points for intussusception. The cysts near the ileocecal valve do not attain a large size, because early in their development they obstruct the intestinal lumen.

*Clinical Picture.*—Duplications of the small intestine may occur at any time from infancy to old age. There is no clear evidence of any sexual or racial predominance. The lesion may be asymptomatic for many years and so be discovered only accidentally. The symptoms may be acute and may appear abruptly in the form of intestinal bleeding, intestinal obstruction or abdominal pain. The intestinal bleeding occurs in most cases in which tubular duplications are lined with gastric mucosa. The bleeding occurs as a result of ulceration of the gastric mucosa (peptic ulcer), caused by the intestinal secretion. The abdominal pain may be caused by distention of the cyst wall or may be due to contraction of the smooth muscles of the intestinal wall. The intestinal obstruction is mechanical and is caused by pressure of the tumor on the intestinal wall or by its projection into the intestinal lumen.

One almost never arrives at the correct diagnosis, since the differential diagnostic list is rather lengthy and the condition is easily confused with other and more common abdominal lesions. Even an all-important diagnostic sign such as a "palpable mass" in the right lower abdominal quadrant is usually mistaken for periappendicular abscess, intussusception, mesenteric cyst or omental cyst.

Roentgenographically the picture is of considerable help in diagnosis of duplications in the thoracic cage or in the stomach or colon, but in the small intestine only general signs of obstruction or compression of the bowel may be observed.

*Embryopathogenesis.*—Three accepted theories of the embryopathogenesis of intestinal duplication exist, according to Gross:[6]

1. The theory of sequestration, which postulates the pinching off of a group of cells from the primitive gut and thus accounts for the development of an adjacent cyst.

2. The theory of diverticular formations (Lewis and Thyng[7]). These diverticula, occurring in various portions of the fetal alimentary tract in pigs, rabbits, cats, sheep and human beings, offers a possible explanation, in view of the rather frequent occurrence of such diverticula in the ileum.

3. The theory postulated by Bremer,[8] which states that the development of the alimentary tract after the solid stage may give rise to hollow structures. This is due to the formation of multiple vacuoles, appearing late in the solid stage, within the cellular mass, which later coalesce and intercommunicate, so that a single hollow tube is created and owing to its failure to fuse with the main gut, creates a duplication.

In our opinion, the first theory ("sequestration") is the most appropriate theory of embryopathogenesis, owing to the frequent presence of different types of mucous membranes in the duplication.

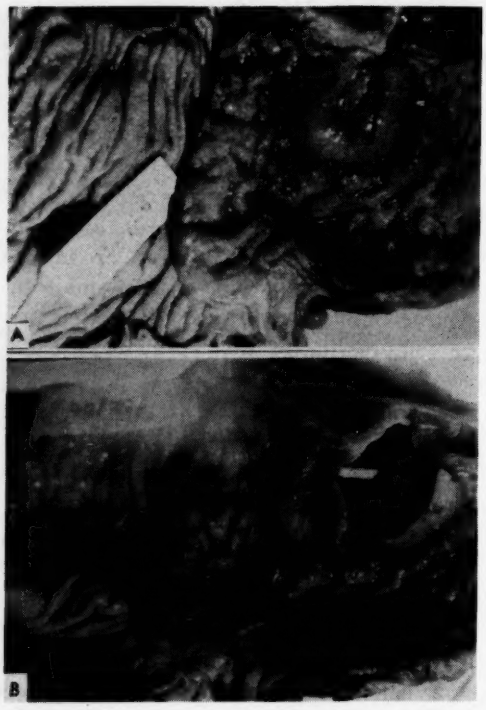

Fig. 1.—*A*, ileocecal region showing oval tumor mass contained in terminal portion of ileum, partly projecting into lumen of intestine. *B*, tumor opened, revealing its cystic nature.

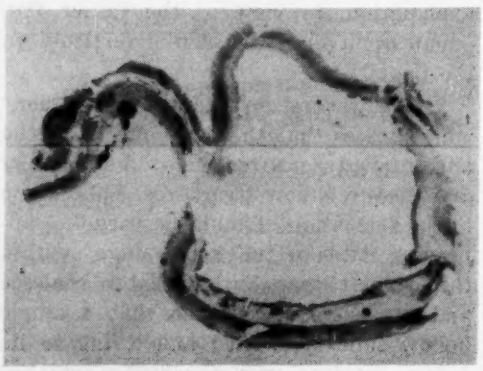

Fig. 2.—Histologic appearance of layers of duplication and their relation to terminal ileal wall.

*General Pathologic Notes.—Histologic Picture of Outer Coats:* The possession of a well-developed coat of smooth muscle several millimeters thick and consisting of two or three layers is a feature common to all duplications and thus enables one to differentiate the anomaly from lymphatic or chylous cysts, the walls being considerably thinner.

*Histologic Picture of Inner Coats:* The epithelial lining of a duplication always mimics some part of the alimentary tract but does not necessarily consist of mucosa of the level at which the duplication is attached.

*Connection with Intestine:* In the vast majority of cases there is firm union between the duplication and the intestine, owing to coalescence of the muscular coats of the two where they come together and fuse with a common wall. The adherent lumen of the duplication may or may not communicate with the lumen of the adjacent alimentary tract. Usually, a clear colorless mucoid fluid fills the cavity, secreted by its own mucosa. Sometimes the fluid is under such high pressure that necrosis and sloughing of the lining mucosa occurs, thus causing the fluid to be cloudy or hemorrhagic.

*Treatment.* — The surgeon must be aware of the fact that the duplication is situated almost always on the mesenteric side of the bowel. It usually shares a blood supply with the adjacent normal intestinal tube, and the internal muscular wall is common as well. This fact complicates surgical treatment; no attempt should be made to dissect away the lesion, therefore, since in order to do so it would be necessary to open the intestine and impair its blood supply. In 1934 the mortality rate associated with primary resection of the intestine reached

79 per cent (Hughes-Jones[9]); Waugh,[10] in 1939, urged rejection of primary surgical anastomosis. In those days marsupialization was also suggested.

Modern operative and anesthetic technics, with adequate preoperative treatment, have been responsible for the favorable results of primary resection during the years just past.

It is the consensus that this surgical technic is a unique method of treatment. For poor surgical risks in a state of dehydration, the Mikulicz technic for exteriorization of the involved loop should be employed.

## REPORT OF CASES

CASE 1.—W. D., a boy aged 4½ years, was admitted to the pediatric ward on May 22, 1956, with acute abdominal pains and vomiting of three days' duration. Clinical examination showed the child to be in good general condition. There was no past history of any illness, except for bilateral cryptorchidism. In the right lower abdominal quadrant a tender egg-sized tumor was palpable. The results of laboratory examinations, including intravenous pyelographic study, were normal. A barium enema showed free passage of the barium up to the cecum, where signs of compression from outside the bowel were noted. As the acute signs of pain and vomiting subsided, our tentative diagnosis was periappendicular abscess or probably a tumor of the right undescended testicle. As antibiotic treatment did not influence the condition and signs of subileus continued to exist, the boy was operated on (by A. Aloti, M.D., F.I.C.S.) on May 30, under general anesthesia. The operation revealed multiple adhesions of the cecum and the terminal portion of the ileum, with a cystic tumor the size of a prune in the ileocecal juncture. Right hemicolectomy with side-to-side ileotransversostomy was performed. The postoperative period was uneventful. The child was discharged in satisfactory general condition on June 8.

*Pathologic Features*: The gross specimen consisted of a segment of bowel comprising cecum and ascending colon, 6 cm. in length, with an adjacent segment of terminal ileum 7 cm. long. The ileal segment contained in its wall a prune-sized, umbilicated, smooth-surfaced tumor that projected partly into the lumen of the intestine and partly into the peritoneal cavity. The tumor was situated 2 cm. from the ileocecal valve and was covered internally by the ileal mucous membrane and externally by visceral peritoneum (serosa).

It was somewhat elastic and fluctuant, and no connection could be found between the lumen of the intestine and the contents or inside mass, as the covering mucosa was intact. When the tumorous structure was opened,

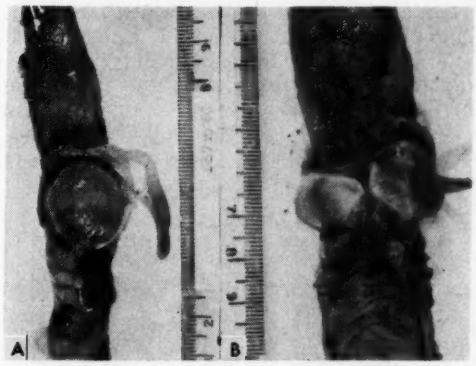


Fig. 3.—*A*, mucous membrane aspect of terminal ileum revealing spherical mass protruding into intestinal lumen. (Note appendix issuing from closed cecum.) *B*, mass opened, showing inner smooth glistening lining of cystic cavity.

Fig. 4.—Histologic appearance of cross section of cystic duplication of ileum.

a cystic cavity was entered, which contained approximately 5 cc. of turbid straw-colored fluid. Chemically, only cholesterol crystals were identifiable; bacteriologically, the fluid was sterile (Fig. 1, *A* and *B*).

Microscopically the following consecutive layers in the wall of the ileum were observed, including the cyst: Starting with the mucous membrane of the ileum, we found the 3 normal layers of the ileal wall, adjacent to which the cyst (duplication) with its mucosa and then the layers of the normal adjoining ileal wall completed the picture. No signs of ischemic changes could be detected (Fig. 2).

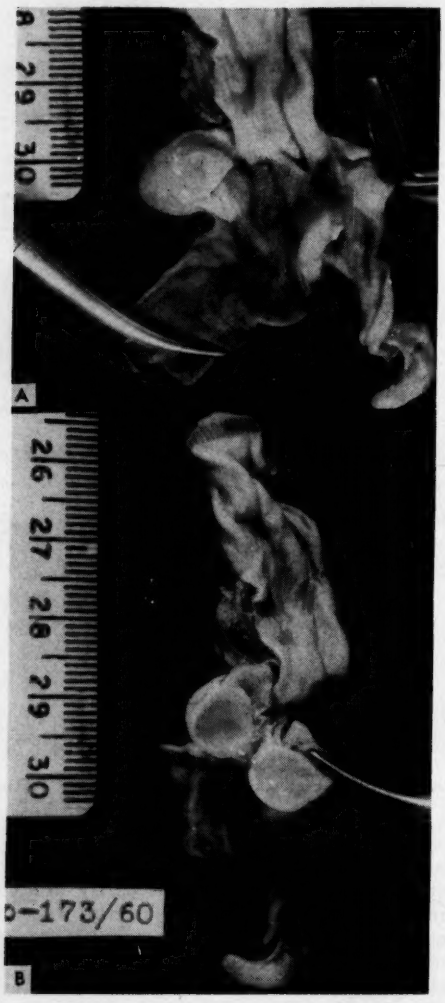


Fig. 5.—*A*, close-up view of the terminal ileal portion of ileum, revealing oval, fluctuating and somewhat pedunculated mass encroaching upon ileocecal valve. (Note appendix issuing from cecum.) *B*, cystic cavity of the mass laid open, showing similar features to those observed in Figure 3*B*.

CASE 2.—A. A., a boy 1 month old, was admitted to the hospital on July 10, 1960, with biliary vomiting of twenty-four hours' duration and no bowel movements at all. The boy's general condition appeared deteriorated, and he was restless. Prior to admission some red blood had been discharged from the rectum. Clinical examination revealed distention of the abdomen and hyperperistalsis, clearly palpable and visible. No tumor could be palpated. Upon rectal examination, blood was noted on the gloved examining finger. Roentgen examination revealed distention of the small intestine, the large bowel not being visible. The roentgen diagnosis was suspected obstruction of the ileocecal juncture. Laparotomy was performed immediately by one of us (M. S.).

A cystic tumor of the terminal portion of the ileum, with complete obstruction of the bowel, was present. Resection of the terminal segment of the ileum and cecum, with end-to-end anastomsis between the ileum and the ascending colon, was performed.

This was followed by an uneventful recovery.

*Pathologic Features*: Grossly the specimen consisted of a segment of the terminal portion of the ileum 6 cm. long, attached to the cecum and a segment of ascending colon 5 cm. long, with an appendix 3.5 cm. in length (issuing from the cecum). When the intestinal wall was opened, an oval tumorous mass 1.5 by 2 cm. was seen to be attached to the wall of the ileum by means of a broad base. Its outer surface was smooth and its color a dirty grey. The oval mass was partly contiguous with, and encroached upon, the ileocecal valve. Its consistency was that of a fluctuant mass. On cross section the mass revealed a unilocular cystic cavity. This was entered and proved to be filled with a semitranslucent greyish white fluid. The inner lining of the cystic cavity was smooth and glistening (Fig. 3, *A* and *B*).

*Microscopic Features*: The microscopic features were essentially the same as those observed in Case 1 (Fig. 4).

CASE 3.—In this case the duplication was discovered incidentally during a necropsy performed on a 24-hour-old girl. The following

*multiple congenital malformations* and pathologic changes were observed: (1) arthogryposis (multiplex, congenital); (2) hypognathism; (3) talipes equinovarus; (4) scoliosis, moderate, of the thoracic portion of the vertebral column; (5) hypertrophy of the pituitary and thyroid glands; (6) pronounced fatty degeneration of the liver; (7) persistent or patent ductus arteriosus, and (8) dilatation of the heart, chiefly on the right side.

Opening of the terminal ileal segment disclosed an oval, glistening, greyish, fluctuating and slightly pedunculated tumorous mass, 1.5 by 1 cm., projecting into the lumen. It was attached to the ileal wall near the ileocecal valve and practically overrode the ileocecal juncture (Fig. 5, *A* and *B*).

*Microscopic Features*: The histologic features were identical with those observed in Cases 1 and 2. Thus the total number of personal cases of duplication of the ileum is 3 (Fig. 6).

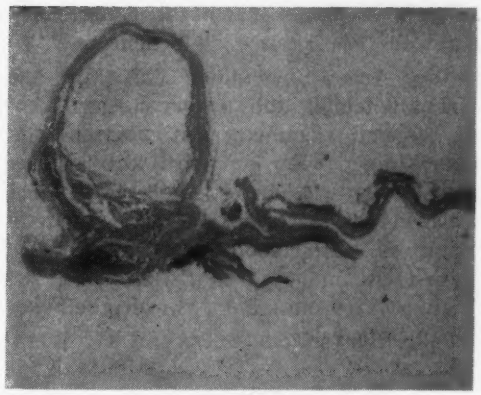

Fig. 6.—Histologic view of duplication attached to its terminal ileal base.

## COMMENT

In Case 1 it became clear that the cystic structure lay within the submucous layer of the ileum and was lined by a mucous membrane and muscularis mucosa of its own, showing practically the same structure observed in the regular ileal wall, though of course slightly thinner, owing to the fact that the mucosa was subjected to constant pressure by the contained fluid.

Case 2 was a second and similar case of cystic tumor within the terminal portion of the ileum, projecting into and partially occluding the lumen of the intestine and also encroaching upon the ileocecal juncture and causing obstructive ileus. As the microscopic features were the same, we consider it justifiable to classify this case under the general heading "duplications of the terminal portion of the ileum." In Case 3, had the child lived, the ileal malformation would undoubtedly have caused more alarming symptoms of obstructive ileus.

Clinically, it is worth while to emphasize the fact that in the first case the differential diagnosis lay between periappendicular abscess and a tumor of undescended right testicle.

Several days later we thought of the possibility of a mesenteric or omental cyst. In the second case the diagnosis of intussusception was justified because of the presence of blood on the rectal examining finger and the roentgenograms showing obstruction at the ileocecal valve. In both cases the clinical observations had justified our reasoning in the differential and alleged diagnosis, but the possibility of a duplication of the alimentary tract was not considered, and it was not until the time of operation (note also the accidental discovery at necropsy in Case 3) that the correct diagnosis was made. In our series of approximately 1,800 fetal and neonatal necropsies performed over a period of twelve years we have encountered only 1 case of duplication of the alimentary tract.

## ZUSAMMENFASSUNG

Die Arbeit befasst sich mit einer ungewöhnlichen Ursache der Obstruktion der Endschlinge des Ileums, nämlich der Verdoppelung des Ileums. Die Anomalie

ist zwar selten, verdient aber nach Ansicht der Verfasser doch Beachtung.

Die Arbeit behandelt das klinische Krankheitsbild, die embryonale Pathogenese und allgemeine pathologische Beobachtungen. Ferner wird die einzige Form der Behandlung, die primäre Resektion des betroffenen Darmabschnittes, beschrieben. Drei Fälle werden dargestellt und erörtert. Besondere Betonung wird auf die Schwierigkeit der Diagnostik gelegt.


RÉSUMÉ

L'iléus double est un facteur étiologique constituant une cause supplémentaire d'obstruction terminale de l'iléus. Les auteurs estiment qu'il ne faut pas en négliger l'importance dans le diagnostic.

Le tableau clinique, les observations embryologiques, pathogéniques et de pathologie générale sont discutées. Le seul traitement possible, décrit ici, est la résection primaire du segment impliqué.

Trois cas sont rapportés et discutés.

La difficulté du diagnostic est mise en évidence.

RIASSUNTO

Viene trattata la duplicazione dell'ileo quale fattore etioloco di occlusione dell'ileo terminale. Benche' rara, questa anomalia deve essere tenuta in considerazione.

Ne vengono esposti il quadro clinico, l'embriopatogenesi e la anatomia patologica. L'unica forma di cura e' rappresentata dalla resezione del segmento ileale interessato.

Vengono riferiti e discussi tre casi e segnalata la difficolta' della diagnosi clinica.

RESUMEN

Se trata en este trabajo sobre un caso de obstrucción del ileon debida a duplicación del mismo. Aunque ciertamente rara eata afección, constituye, de acuerdo con la opinió del autor, un factor digno de consideración.

Se describen el cuadro clínico, la etiopatogénesis y la anatomía patológica. Se describe también el unico tratamiento que consiste en la resección primaria.

Se complementa el trabajo con comentarios sobre tres casos.

También se hace resaltar la dificultad del diagnóstico.


REFERENCES


1. Williams, J. A.: Intestinal Obstruction in a Case of Duplication of the Terminal Ileum, Arch. Dis. Childhood **34**:12, 1959.

2. Killpack, W. S.: Duplication of the Ileum. Arch. Dis. Childhood **28**:2, 1953.

3. Potter, E. L.: Pathology of the Fetus and the Newborn. Chicago: The Year Book Publishers, Inc., 1952.

4. Cited by Moore, T. C., and Battersby, J. S.: Congenital Duplications of the Small Intestine: Report of 11 Cases, Surg., Gynec. & Obst. **95**:557, 1952.

5. Ladd, W. E., and Gross, R. E.: Surgical Treatment of Duplications of the Alimentary Tract: Enterogenous Cysts, Enteric Cysts or Ileum Duplex, Surg., Gynec. & Obst. **70**:295, 1940.

6. Gross, R. E.: Surgery of Infancy and Childhood. Philadelphia: The W. B. Saunders Company, 1953, p. 211.

7. Lewis, F. T., and Thyng, F. W.: The Regular Occurrence of Intestinal Diverticula in Embryos of the Pig, Rabbit and Man, Am. J. Anat. **7**:505, 1907.

8. Bremer, J. L.: Diverticula and Duplications of the Intestinal Tract, Arch. Path. **38**:132, 1944.

9. Hughes-Jones, W. E.: Enterogenous Cysts, Brit. J. Surg. **22**:134, 1934.

10. Dockerty, M. B.; Kennedy, R. L. J., and Waugh, J. M.: Enterogenous Cysts, Proc. Staff Meet. Mayo Clin. **14**:664, 1939.


ADDITIONAL SOURCES


Donovan, E. J., and Santulli, T. V.: Duplications of the Alimentary Tract, Ann. Surg. **126**:289, 1947.

Gross, R. E.; Holcomb, G. W., and Farber, S.: Duplications of the Alimentary Tract, Pediatrics **9**:449, 1952.

Ladd, W. E., and Gross, R. E.: Abdominal Surgery of Infancy and Childhood. Philadelphia: The W. B. Saunders Company, 1941.

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# Cardiovascular Surgery

## Direct Operations in the Treatment of Complications of Portal Hypertension

NORMAN C. TANNER, M.D., F.R.C.S.

LONDON, ENGLAND

IT HAS been my opinion for many years that one of the severest criticisms made of medical literature was that some surgeons show a tendency to publish conclusions on various forms of treatment too soon after carrying them out. Time must pass before any useful assessment can be made of an operation for a chronic illness, or of an operation that alters physiologic mechanisms. In describing the results of operations for ulcer, for example, many authors prematurely include patients who have not been under observation for five years, either in order to publish quickly or to increase their number of case reports. Some articles even appear to have been written while the patients described in the latest case reports were still in the hospital. Most hospital residents applying for senior appointments find it helpful to show their quality by publishing case records of their work. They should be advised not to publish the results of treatments in which they have recently taken part unless they are making preliminary observations of newly introduced methods of treatment or reporting on operations for acute conditions.

In this respect, it is a pity that physicians cannot, in this age, follow the example set by William Harvey. He acknowledged his debt to the work of the anatomist, Fabricius, who had, while working in Padua, shown him that the venous valves of the heart allowed only unidirectional flow. Harvey then worked for twenty-five years before publishing his immortal book, *De Motu Cardis* (Frankfurt, 1628).[1]

For this reason, I did not make a real attempt to assess an operation I had introduced in 1948 and modified in 1950[2] until last year, ten years later.

The purpose of this paper is to discuss direct operations for only two of the complications of portal hypertension — hemorrhage due to esophageal varices and ascites.

*Hemorrhage from Esophageal Varices.* —It is hardly necessary to stress the im-

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*The author discusses ascites and hemorrhage from esophageal varices as complications of portal hypertension and describes technics for direct surgical intervention as applied to each. His opinions and conclusions are based on ten years' experience with the procedures he recommends.*

portance of this complication. In the series of 2,545 cases of massive hemorrhage of the upper part of the gastrointestinal tract handled at St. James' Hospital between 1941 and 1959, portal hypertension was the cause of hemorrhage in 80 instances. Although rare, the disease made up for this by its severity and high mortality rate.

An effective operation for bleeding from esophageal varices is the transgastric portoazygos disconnection, which involves an attempt to cut off hypertension of the portal system from the esophageal circulation and divert the great volume of blood from the esophageal veins.

This operation has a similar effect to the one in which an intragastric balloon is used to stop acute bleeding. A balloon is placed in the stomach, inflated and drawn firmly to the cardia; the vessels running through and around the cardiac end of the stomach are firmly compressed between the edge of the esophageal hiatus above and the balloon below. The venous blood flow from the stomach to the esophagus is thus obstructed.

The procedure, in my first attempt to to simulate the use of this balloon surgically, was to divide all the veins entering the upper portion of the stomach and transect and resuture the stomach just above its midpoint. This proved inadequate, because certain veins, lying just above the cardiac orifice and connecting the cardiac region with the liver or the diaphragm, may be hypertensive and so keep the esophageal veins hypertensive. During the past eleven years, therefore, this operation has been modified, and is now performed by completely freeing the lowermost 5 cm. of the esophagus, the cardiac region and the uppermost cm. of the stomach from all external vascular and ligamentous connections, and then transecting the stomach 5 cm. or less from the cardia.

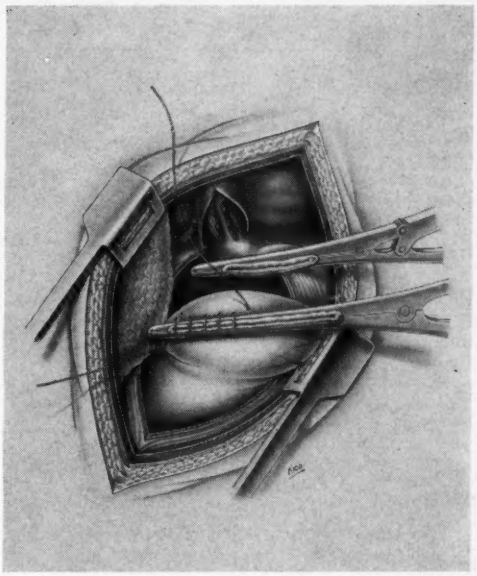

Fig. 1.—To compensate for disparity in lengths of cut ends of stomach to be anastamosed in fundic region, part of lesser curve side of lower cut end may be closed.

There have been widespread misconceptions about this operation, which have led to considerable variation in the results obtained from it. Some have simplified its designation, calling it "gastric transection," and in performing the operation, have limited themselves to that. Actually, gastric transection is merely the final stage of the operation; it would cause no more than a few hours' diminution of the blood flow through the varices and would have no effect at all on the blood pressure within them.

Some have complained that the suture line may leak. This has never occurred in any of my cases when stomach was joined with stomach. Leaking can be prevented by using two safeguards: (1) The transection line should be no more than 5 cm., measured with a rule, from the cardiac orifice in the stomach, and (2) when the parts are anastomosed, this should be done in such a way that the well-vas-

*Results of Portoazygos Disconnection**

| *Operation* | *No. of Patients* | *Operative Deaths* | *Late Deaths* | *Recurrent Bleeding* | *Encephalopathic Conditions* |
|---|---|---|---|---|---|
| Portocaval anastomosis | 21 | 3 | 8 | 2 | 6 (3 severe, 3 mild) |
| Splenorenal anastomosis | 7 | 2 | 1 | 0 | 0 |
| Portoazygos disconnection | 32 | 4 | 6 | 16 (8 minor) | 1 (fatal, present prior to operation) 6 |

*Operations for esophageal varices (including interval operations), 1949-1959.

cularized lower part is drawn over the poorly vascularized upper part.

The greatest difficulty encountered with this operation is that the work must be done in that area in which collateral circulation is at its maximum. Difficulties are greatly increased if there have been many previous operations involving this region. Thus, if adequate exposure is to be obtained, an abdominothoracic approach is usually required and considerable care with hemostasis and blood replacement is necessary at all stages. As I indicated in my Hunterian Lecture,[3] after the division of the stomach has been made, it can be observed that the lower segment is much wider than the upper. The procedure can be made easier if the medial half of the cut end of the stomach is closed (Fig. 1), and if, finally, the cut upper end of the stomach is anastomosed to the mobile lateral half of the lower end of the stomach (Fig. 2). The vagus nerve is necessarily sacrificed in this procedure, though the celiac branch of the posterior vagus nerve can be spared.

*Indications for Portoazygos Disconnection:* The problem of preventing acute bleeding from esophageal varices induced me to try this operation in the hope that it might have an immediate, and perhaps some permanent, effect. As these hopes were, to some extent, fulfilled, I have since used the operation as an interval procedure, particularly in those cases in which a portosystemic anastomosis could not be created, or portosystemic encephalopathic conditions already existed, for no tendency for portoazygos interruption to increase portosystemic encephalopathic change was observed.

*Complications.*—Needless to say, in my experience with this operation, I have encountered a number of complications, many of which may lead to recurrent bleeding. This is hardly surprising, since the disease is extremely complicated and often fatal. Rather than abandon the operation, I have endeavored to discover the causes of these complications and, when possible, remedy them. It is not necessary to discuss such complications as pneumonia, inhalation of blood and coma and failure of the liver, which are common to all operations performed during episodes of bleeding from esophageal varices.

*Gastric Stasis:* Although postoperative gastric decompression usually aids the stomach in emptying normally after a few days, in some cases postvagotomic stasis has persisted, or has been, perhaps, discovered some months later. In most cases, therefore, either a pyloromyotomy, pyloroplasty or gastrojejunostomy should be performed to prevent this complication. If stasis is discovered later, surgical intervention is wise.

*Late Bleeding Along the Suture Line Due to the Use of Non-Absorbable Sutures:* In some of my early cases, I sutured the stomach with continuous sutures of fine linen or silk. I now know this is risky and a cause of recurrent bleeding even when there is no portal hypertension.[4] In 1 case, I had to resect the lower portion of the esophagus, with the suture line intact, a year after the disconnection.

Examination of the specimen revealed the persistence of its sutures. I now use only chromic catgut along the suture line, and have had no more trouble of this sort.

*Gastric Ulcer:* In 1 case, and possibly in a second, gastric ulceration leading to fatal hemorrhage developed after the disconnection procedure. This gastric ulceration was associated with postvagotomic stasis and may well have been the result of gastric stasis. I now, therefore, recommend procedures that will prevent stasis or, if it does occur, will remedy it surgically, and I have encountered no further cases of gastric ulceration.

*Reflux Esophagitis:* The procedure of freeing the cardia from its ligamentous connections may, in some cases, lead to destruction of the valvular mechanism at the cardiac orifice of the stomach. As a result, reflux of gastric juice into the gullet may occur, leading in some cases to heartburn and recurrent bleeding. In my opinion, this is now the most common cause of recurrent bleeding after portoazygos disconnection. The bleeding is usually a mild or moderate melena, rather than a catastrophic hemorrhage such as would occur if the bleeding were from varices. Careful medical management — small frequent meals, avoidance of stooping and recumbency and the regular use of anticholinergics and non-absorbable alkalis—may help prevent this complication. In cases of severe involvement, further operations to deal with peptic esophagitis may be needed. In 3 cases I performed an esophageal transection followed by anastomosis of the esophagus to a Roux loop of jejunum, to correct the reflux. In an endeavor to prevent reflux esophagitis, I have at times modified the operation as follows: After mobilization and devascularization of the lower portion of the esophagus and the cardiac end

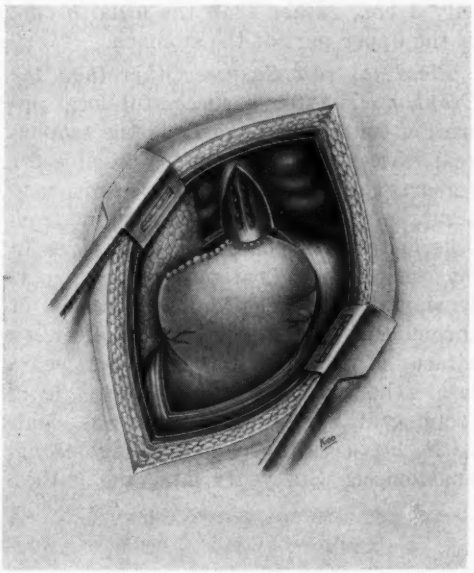

Fig. 2.—Anastomosis completed.

of the stomach, the stomach is transected only 3 cm. below the cardiac orifice. Instead of a gastrogastric anastomosis, a gastrojejunal anastomosis is made (Fig. 3). The lower part of the stomach may be closed and left *in situ* or may be removed.

Some further important points concerning this modification of the operation should be mentioned. The first is that if the operation is being performed to stop acute bleeding and the surgeon is uncertain whether the bleeding is coming from the peptic ulcer or from the gullet, the operation is adequate for either condition. Further advantages are that postoperative gastric stasis, gastric ulcer and reflux esophagitis are avoided. I must add, however, a word of warning. Because of the lowered vitality of the devascularized stump of stomach, it is well to "bury" it with large seromuscular sutures. This is difficult if the jejunum is used, and it is for this reason that I advocate leaving

only 3 cm., rather than the usual 5 cm., of the upper part of the stomach.

*Bleeding from Sources Other than the Esophagus:* After a successful local operation for hemorrhage from the esophageal varices, it is nonetheless possible for hemorrhage due to portal hypertension to occur, as it may take its origin from other sites. This occurred in 2 cases in my series. In 1 patient, portal hypertension had developed as a result of thrombosis of the portal vein after an attack of appendicitis. Thirteen years later the patient bled severely from esophageal varices, and this was dealt with by creating an esophagojejunal anastomosis. Six years later the patient bled to death owing to varicosity in the cecum, which had developed in the adhesions between the cecal and parietal veins as a result of the appendiceal inflammation.

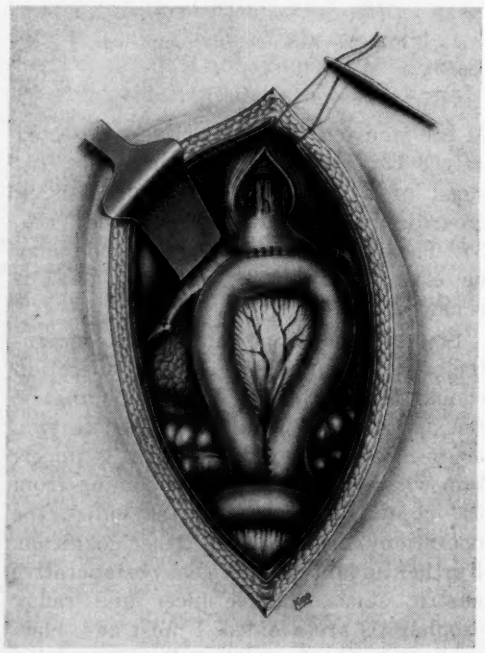

Fig. 3.—In an endeavor to minimize effects of reflux after portoazygos disconnection, upper cut end of stomach may be united to jejunal loop. In such cases, remnant of stomach must be minimal in size to prevent necrosis. This also prevents recurrent gastric bleeding in cases of acute hemorrhage, when it is suspected that stomach or duodenum may be real source of bleeding.

*Other Forms of Portoazygos Disconnection:* Other forms of disconnection have been explored, with varying results. I have mentioned one variation — completing the operation by making a gastrojejunal anastomosis or by transecting the gullet in the thorax and making an anastomosis of the cut upper end to a Roux loop of jejunum. I have also transected the gullet high in the chest and brought up the colon to replace the esophagus.

Several forms of esophagectomy have been used, varying from resection of the lower portion of the esophagus and esophagogastric anastomosis, to resection of all of the intrathoracic portion of the esophagus. These operations carry a somewhat higher mortality rate than does transgastric disconnection, but they have their place, particularly as secondary operations. In the future, they may be used more frequently as primary operations.

It will be noted that major recurrent bleeding is more frequent after portoazygos disconnection than after portocaval anastomosis. The mortality rate in both instances depends upon the degree of selection used.[5] I have already detailed the causes of many of these recurrent hemorrhages and indicated how their number may be reduced in the future. The advantage of the disconnection technic lies in the fact that it can be performed when a shunt is impracticable or when there is acute bleeding, without producing or increasing existing portosystemic encephalopathic disturbances.

My opinion is that in the future an operation of this sort, or a modification

of it, may play a great part in the treatment of bleeding esophageal varices.

*Ascites:* I have little to add on the subject of ascites as a complication of portal hypertension. Medical management, such as an attempt to raise the amount of blood proteins, and the administration of a diuretic of the hydrochlorothiazide type combined with an aldosterone antagonist, such as spironolactone (aldactone), must be tried at first, and such treatment is often successful.

In cases of severe and resistant involvement, surgical intervention may be helpful. A portocaval shunt (I still use an end-to-side anastomosis) may relieve the condition, and is to be recommended particularly for patients who are bleeding from esophageal varices. Such an operation may even lead to an improvement in the function of the liver.[6] All other operations, such as ileoentectrophy, anastomosis of the peritoneum to the urinary tract and saphenoperitoneal anastomosis, must still be regarded as experimental, although the two former operations have had moderate degrees of success in some cases. Here a word about saphenoperitoneal anastomosis is in order. I have performed this operation on 4 occasions upon 3 patients, 2 of whom had hepatic cirrhosis and 1 of whom had chylous ascites. In the cases of cirrhosis, 1 operation, a single anastomosis, was a failure. The second, performed on a woman in the late stages of hepatic failure, was a bilateral operation. There was some diminution of the ascites, and when she died of liver failure a few weeks later, one of the anastomoses was patent. The third patient had chylous ascites due to an old tuberculous disease of the abdominal lymphatics. He was 62 years of age, his illness was severe, and he required paracentesis every two to three months for three years. After saphenoperitoneal anastomosis had been performed on May 12, 1957, he needed one further paracentesis, and from then until his death more than three years later, the abdomen retained a normal outward appearance. This may appear to be little enough encouragement to continue the use of this operation for ascites, and it may be that ascites due to lymphatic obstruction is less likely to produce thrombosis in the saphenous vein. This operation, however, is a relatively minor one, and, in my opinion, it is justifiable to utilize it somewhat further for suitable patients. My technic is to expose and free 10 to 15 cm. of the internal saphenous vein, divide it at this distance below the saphenous opening, and make sure that blood does not escape from the upper end and that ascitic fluid can be injected through it into the blood stream without difficulty or reaction.

With great care not to kink the vein, it is then drawn up through an opening in the inguinal ligament to the extraperitoneal region. The peritoneum is thinned by removal of much of its outer fibrous layer. A knuckle of it is then picked up with an anastomosis clamp and an end-to-side anastomosis made, as wide as is practicable, between the vein and the peritoneum. It is probably best to perform the operation not immediately after a paracentesis but while a moderate amount of ascites is present, so that a good flow through the vein will commence immediately after the anastomosis is made.

RÉSUMÉ

Deux complications de l'hypertension porte sont discutées: 1) ascite; 2) hémorragie par varices oesophagiennes. Pour cette derniére complication, l'auteur recommande une disjonction transgastrique porto-azigos, opération qu'il décrit en détail en mentionnant ses complications possibles. Pour l'ascite, il conseille un traitement médical lorsque c'est possible,

et une intervention chirurgicale dans les cas graves et rebelles.

SUMARIO

Duas complicações de hipertensão porta são discutidas:

(1) ascite e

(2) hemorragia de varises esofageanas. Pa ra a ultima condição, o Autor recomenda desconexão transgátrica porta-azygos, operação que descreve com detalhes não omitindo suas possiveis complicações. Para ascite advoga cuidados médicos quando possivel e intervenção circurgica quando a condição é grave e resistente.

RIASSUNTO

Vengono discusse due complicanze dell'ipertensione portale; l'ascite e l'emorragia da varici esofagee. Contro quest'ultima l'autore raccomanda la discontinuazione porto-azigos trans-gastrica, intervento di cui descrive la technica in dettaglio e le possibili complicazioni. Quanto all'ascite egli consiglia la cura medica, quando possibile, e l'intervento chirurgico quando il caso e' grave e resistente alla terapia.

REFERENCES

1. McMichael, J.: Brit. M. J. 1:1123, 1961.
2. Tanner, N. C.: Proc. Roy. Soc. Med. 47:25, 1954.
3. Tanner, N. C.: Ann. R.C.S. Eng. 3:153, 1961.
4. Tanner, N. C.: Macarthur Lectures, Edin. M. J. 58:288, 1951.
5. Riddell, A. G., and Jones, W. K.: Studies in Portal Hypertension, Brit. M. J. 1:928, 1961.
6. Hunt, A. H., and Lehmann, H.: Gut 1:303, 1961.

As the beginning of the present century approached, the speed-up of scientific discovery bearing on surgery had become exceedingly noticeable. Two of the greatest discoveries, anesthesia and antisepsis, had come one on the heels of the other, and lesser developments were changing the practice of surgery almost year by year. The work of the pathologist, the bacteriologist and the roentgenologist were all coming to the support of the surgeon. The surgeon was fast ceasing to be a lone worker.

In former days there had been perhaps two or three good surgeons in any of the largest cities at any one time. In the last decade of the nineteenth century their numbers had increased, and men whose work was of the highest order were to be found in most of the cities of smaller size. The names of these men do not appear in history, though their knowledge was great and their skill considerable, and their combined efforts raised the standards of their profession to a new level. These unknown men numbered many thousands, and were any one of them transplanted into any era of the past, with all subsequent knowledge subtracted, the remaining qualities of heart and mental outlook would have made him famous.

—*Young*

# The Diagnosis and Treatment of Carcinoma of the Prostate: Some Useful and Practical Suggestions

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*The authors outline their experience in the diagnosis and treatment of prostatic carcinoma, emphasizing the fact that the problems involved remain numerous and complex despite modern advances in both technic and equipment. They list the instruments and procedure both diagnostic and therapeutic, which in their hands have proved advantageous and suggest areas in which further study may result in a spectacular "breakthrough" for the future.*

ALL who have studied the subject thoroughly agree that carcinoma of the prostate still presents terrific problems in both diagnosis and treatment. Great improvements have been made in the training of urologic personnel and in the development of diagnostic and therapeutic armamentaria. These advances have increased the accuracy and efficiency of the urologists. Prostatic carinoma remains difficult, if not impossible, to diagnose early in some cases, and the proper treatment demands thorough training of the person who undertakes it, as well as the latest and best equipment.

This paper deals with experience in the treatment of this disease as obtained or recorded in the archives of the Urological Institute beginning July 1, 1927, about thirty-four years ago. It includes the work of those associated with the Institute in the past as well as that of its present personnel. The article is not intended to be controversial. It is a factual presentation of the experience gained in our clinic as compared with well-known and accepted reports from recognized groups of workers. We shall present our observations and suggestions in the usual order of discussion of any clinical disease, i.e., incidence, etiologic factors, pathologic picture, diagnosis, treatment and prognosis.

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*Incidence.*—Our data are in agreement with those published, which state that the incidence of carcinoma of the prostate in men over 50 years of age is surprisingly high. Its incidence in cases of prostatic obstruction is about 25 per cent, not including so-called occult carcinoma of the prostate, detected on serial section of the benign adenoma. These increase our overall percentage to almost 37 per cent. This is slightly higher than the figures reported by Scott, Ferguson, Colby and others, but it is not out of line when one considers the work done by the Hinmans on the West Coast, in which they report the serial sectioning of many previously diagnosed benign adenomas with a very high rate of carcinoma. The incidence of prostatic carcinoma associated with calculous disease of the prostate averages about 15 per cent, which is in agreement with most of the published articles and is no higher than the routine percentage of carcinoma discovered at routine autopsies. We have also found no difference in the incidence of carcinoma between the Negro and the white race; this again is in accord with the published literature. We are detecting more carcinomas now than we were ten years ago; this, in our opinion, is due chiefly to the conscientiousness of the general practitioner in medicine, who is being taught in our medical schools and in his postgraduate assemblies the great value of a rectal examination for all men over 45 and the proper evaluation of any type of abnormality in the prostate. All surgeons should commend this at every possible opportunity, thereby doing both themselves and the general public a tremendous service.

*Etiologic Factors.*—No one knows the cause of prostatic carcinoma. There are many theories. Investigation of many reveals points of probability. We have had no great experience in the treatment of Orientals, but we have been informed through reliable sources that the incidence of the disease among them is extremely low. Possibly this lead should be followed with more study. Apparently both nodular hyperplasia and carcinoma of the prostate are due to a disturbance of androgens and estrogens in men beyond middle age. In our experimental animal laboratory at the Urological Institute, we have noted some interesting changes in the effect on bull calves and dogs and cats of androgen and estrogen administered to uncastrated and castrated animals. Our work has not gone far enough to be reported, but the results thus far definitely support the working hypothesis that administration or deprivation of androgens and estrogens can cause drastic changes in the animal.

*Pathologic Picture.*—Both the gross and the microscopic aspects of carcinoma of the prostate offer a most interesting pathologic study. The amount of literature available upon this subject is tremendous and is, for the most part, of high quality. Our observations are in general agreement with the idea now usually accepted, that the posterior lobe is no longer always the seat of malignant changes. Careful pathologic studies commonly show the primary growth originating in the periphery of the lateral lobes. There is still a slight predilection for the posterior lobe. Here, incidentally, we should like to point out that the frequent origin of carcinoma on the periphery of the lateral lobes is a major explanation of its occurrence in patients who have undergone a benign adenoma enucleation by any of the three usual routes, perineal, retropubic and suprapubic. We have encountered this a number of times, both in patients operated on by men of our group and those operated on by competent urologists elsewhere. This would also appear to be a point well worth remembering when a transurethral resection for pros-

tatic adenoma is contemplated. The fact that the majority of prostatic malignant tumors originate in the posterior lobe or in the periphery of the lateral lobe and rarely, if ever, in the middle lobe, definitely enhances the value of a transrectal digital examination. Our observations agree definitely with those of Dr. Hugh Young in the past and those of Dr. Gershom Thompson, relatively recent. Both have stated that most prostatic carcinomas are adenocarcinomas. This further supports the theory of endocrine disturbance, since this type of growth is more prone to influence by overstimulation by, or lack of, certain endocrines. Carcinoma of the prostate, being a malignant disease, is characterized by metastasis with early invasion, usually within the perineural lymphatic spaces, and definite spread through both the lymph stream and the blood stream. Our histologic studies of prostatic carcinoma localized in the capsule have shown perineural lymphatic invasion in the vast majority of cases. We are unable to cast additional light of any value on the controversy as to the exact manner in which early bony metastases occur. There appears to be ample ground for the suggestion that they may occur through the perineural lymphatics, and there is also excellent evidence of spread through the blood stream. The results of our studies definitely support published data to the effect that the bony pelvis and the lower portion of the spine are usually the first areas to be invaded, that the direct spread of malignant disease is usually slow, and that definite limitation to growth is affected by Denonvilliers' fascia. The regional lymphatics, and the pelvic and lumbar lymph nodes, as well as thoracic and subclavicular nodes, may be involved. The spread is usually first local, becoming widespread later. It would appear to us that the early spread is probably chiefly lymphatic and that the later changes, resulting in widespread dissemination, probably occur through the blood stream. There is no set rule with regard to rate of speed or route of spread. The parts most frequently involved are the lymph nodes and the bones. Metastasis has also been noted at times in the lungs and, occasionally, the liver. At this point we wish to emphasize the extreme value of a competent, careful and industrious pathologist in carrying out this work.

*Diagnosis.*—Years ago Hugh Young stated that the principal resource in the diagnosis of prostatic carcinoma is rectal examination. We heartily agree with him and with other authorities on this most important subject. We cannot express too forcibly our thoughts that every male patient, certainly those past 40 years of age, should have a careful rectal examination on every routine investigation. Not only should this examination be made at definitely appointed times, it should be repeated, and if a nodule or any other suspicious change is noted a transrectal needle biopsy should be done at once by a competent person. This is most important, since so many carcinomas of the prostate present no symptoms and can be detected and diagnosed in the early stage only if the examining physician is alert to the possibilities and is educated and trained to make a good rectal digital examination and, when a nodule or suspicious change is discovered, see that this nodule or area is competently appraised. Cytologic studies of prostate secretion have not proved worthwhile in our clinic, and we agree with Pratt-Thomas' published reports on this subject.

In our cases the symptoms presented have been dysuria and slowness and frequency of urination in about 50 per cent. About 25 per cent of the patients first present themselves with acute retention of urine. Low lumbar pain was com-

plained of in about 15 per cent of our cases. Hematuria occurred in less than 10 per cent of the cases of primary carcinoma; in the cases of carcinoma occurring after enucleation of a benign adenoma, however, the percentage was considerably higher. For this reason we wish to stress extreme importance of a complete check-up, with needle as well as transurethral biopsy, in every case in which such an enucleation has been done and has had sufficient time for healing, if the symptoms of hematuria are present. After a thorough physical examination and a thorough history, with emphasis on the urinary aspect, a careful digital examination should be made. If there is any suspicion that a lesion exists, the patient should be subjected to cystoscopic evaluation with a transrectal needle biopsy or a transurethral biopsy, either or both as indicated, after the gland has been thoroughly studied with an endoscopic instrument, with right angle vision, forward vision and retrograde vision. We are under the impression that transurethral biopsy can be improved by means of an improved instrument, which some of us have discussed with a leading instrument manufacturer. We have modified the McCarthy cystoscopic hemostatic clamp with some success, but this needs improvement. The use of a cold punch or resectoscope necessitates an additional instrument, and there should be an instrument for use through the diagnostic sheath necessary for the proper visual evaluation. We have studied and used Tomsky's method of transrectal biopsy and found it excellent. We prefer, however, to do our transrectal biopsies at the same sitting that the cystoscopic work is done and under the same anesthesia, induced with sodium pentothal. The technic we have found acceptable is to have the patient prepared for roentgen studies, with administration of licorice powder the night before and the use of Dulcolax suppositories, if necessary, several hours prior to the examination. After the cystoscopic work has been completed, an alcohol sponge is inserted into the rectum and the palpating finger introduced with the needle tip approximating and slightly proximal to the tip of the palpating finger. When the nodule is located, the biopsy needle is worked directly into the suspicious area. We have found that introducing the cutting blades of the needle into the lumen of the instrument, without using the obturator as suggested by Tomsky and his group, is extremely helpful. We do not hesitate to make several punctures if necessary. We have discontinued the use of chemotherapy prior to a transrectal biopsy, nor do we now use any type of antiseptic except the wet alcohol sponge in the rectum. Postoperatively, we leave a catheter in the bladder through the urethra for at least twenty-four hours and give the patient both antibiotics and chemotherapy for seven days. We have encountered no complications up to the time of writing, and the process is extremely easy and carries with it a minimum of discomfort. We believe that the retention catheter is also beneficial in lessening postcystoscopic discomfort, and if it is needed as a stabilizer for future operations, it can be left *in situ* as long as is necessary. Following these procedures, we take the patient's legs out of the stirrups and do our roentgen studies. With the few cubic centimeters of sodium pentothal usually employed, the patient is cooperative in most instances. A plain roentgenogram of the kidneys, ureters and bladder, showing both soft and bony detail, is taken. This is followed by excretory urograms with the patient in the flat and erect position. At this point we wish to stress the value of the cooperation of a good roentgenologist to in-

terpret the osseous changes and to point out the difficulty sometimes presented by Padgett's disease and other osseous abnormalities.

Prior to cystoscopic study, blood samples are drawn for determination of the levels of blood urea nitrogen, blood sugar and serum acid phosphatase. In our experience, a serum acid phosphatase level above 4 units usually indicates carcinoma spreading beyond the capsule. A point to be remembered is that at least twenty-four hours must have elapsed since any type of trauma to the prostate and the prostatic portion of the urethra, or any examination thereof. We have known false positive serum acid phosphatase readings to result from the simple introduction of a catheter the day prior to cystoscopic study.

The above is our usual procedure with the so-called "early case." In the more advanced case the same general procedure is used, but presents much less difficulty. Before leaving the diagnosis of this malady, we wish to mention, with regard to the general physical status, that loss of appetite, loss of weight, weakness and anemia usually occur in a late stage of the disease. Early carcinomas and even some of the advanced ones present none of these symptoms. As has been stated by Alyea and his co-workers, a hemoglobin level of 12 Gm. or less, is definitely suggestive of metastasis. Edema of the scrotum and the lower extremities may occur late.

*Treatment.*—We are in agreement with most of the published literature that surgical intervention, with complete removal of a nonmetastasizing carcinoma, is the only complete cure. We do not agree with those who prescribe a definite procedure to the exclusion of other methods. In our opinion, any method that removes the entire carcinoma will cure. The problem is to select the type of operation suited to the particular type of lesion, and we are forced to admit that the percentage of complete cures is not too large. Careful study and evaluation are necessary. Jewett's classification of intraprostatic and extraprostatic malignancies, as demonstrated by the signs observed in the capsule, has a great deal of merit. We do not, however, advocate the "unsexing" of a patient who is normal in this respect without extremely careful consideration of the fact that even the smallest and most insignificant lesions in the prostate may already have spread. Flocks has demonstrated this on a number of occasions. We are convinced that as a general rule, not subject to any hard and fast regulation, only those who have small intraprostatic definitely proved lesions, with no evidence of osseous change and no elevation of the serum acid phosphatase level, should be considered for radical or semiradical prostatectomy. The method of our choice is operation by the retropubic route. This permits palpation of the tumor, the capsule, the urethra, the adjacent lymphatics and the seminal vesicles, as well as an examination of the vesical neck. For a man still sexually active it is sometimes a hard decision to make, when one cannot be certain of a cure. The number of patients who should be subjected to radical prostatectomy, in our opinion, is small, and the results we have had show five-year cures in only about 20 per cent. This does not include the cures obtained by enucleation of a benign-appearing adenoma with which a carcinoma occulta was associated. The majority of such patients are cured. By far the greater number of those presenting themselves at our clinic with carcinoma of the prostate have lesions in the so-called late stages. It is our policy in these cases, when the gland is small, to do a transurethral resection and to follow it immediately by estrogen treatment.

We usually employ the synthetic estrogen Tace, which in our experience is more acceptable to the average patient than is Stilbesterol, though no more valuable. If necessary, we do repeated resections if the growth recurs. For large carcinomas, we subscribe to the theory expressed some years ago, that one should remove as much of the carcinoma as possible, place the prostatic portion of the urethra in the best possible condition for drainage and then administer estrogen. We have found the retropubic approach with the incision at the juncture of the prostate and bladder, ideally suited to this type of procedure, and we have a large number of grateful patients in this category. We have a number of patients alive and reasonably well, carrying on their usual occupations five years after such treatment. We have stopped doing routine castration for carcinoma of the prostate; we find that in most cases we can get equally good results with the estrogen therapy. The side effects of large doses of estrogen are no more frequent than those of smaller doses. When estrogen does not control the pain, we do bilateral orchiectomy and implant artificial testes. We have seen no particular advantage of taking out the rete testes, leaving the capsule and epididymis, although we have performed this operation a few times. We are definitely convinced that the presence of the artificial testes has psychic value, and these are supplied routinely. There appears to be no question that large doses of estrogen cause retrogressive changes in both the testes and the prostate, as well as in other sexual characteristics and, of course, the well-known mammary changes. We have observed no cases in which malignant disease of the breasts developed.

Several years ago, after Huggins and his associates reported their early results on adrenalectomy, we performed 16 such operations. All of the patients underwent bilateral orchiectomy and bilateral adrenalectomy. There were no "surgical deaths." The primary results in a few of the early cases, particularly the first one, that of a Negro with multiple and massive metastasis, were very satisfactory. The Negro patient went back to work as a ditch digger and appeared to be in excellent health. In about six months he began to "fade" and, like all the others, succumbed to the carcinoma. None of our cases were as spectacular as the first, and we have not performed an adrenalectomy for a prostatic carcinoma in several years.

Our experience with hypophysectomy is nil. One of our adrenalectomized patients was given roentgen treatment of the pituitary in the late stages, with no changes we could detect. Flocks and his associates are still injecting colloidal gold for prostatic carcinoma of the group generally described as extracapsular. They are now putting most of their injections through the perineum. In our opinion this therapy is sound, and we hope to add it to our armamentarium in the not too distant future.

## SUMMARY

We still have a great deal to learn in the management of this prevalent and dangerous disease. No set rule can be made for either the diagnosis or the treatment of prostatic carcinoma. The educated finger remains the best single instrument for the diagnosis of carcinoma. Cystoscopic study, with transurethral biopsy, is valuable. Transrectal biopsy is an extremely satisfactory procedure, and not dangerous. Determination of the serum acid phosphatase level is extremely valuable in detecting early metastasis. Roentgenograms of the bony pelvis, the lower portion of the spine and the adjacent bony structures are very

valuable. The percentage of cures by radical surgical treatment is still small. We are attempting a modified retropubic operation in which we remove the entire adenoma and the affected portion of a localized lateral lobe without removing the entire capsule or the seminal vesicles. This procedure may have merit; time alone will tell. Transurethral resection is our method of choice for the malignant tumor of the small prostate when it has progressed beyond the stage at which radical operation is possible. We prefer the retropubic approach for most of our open prostatic operations on large tumors, and we try to stress the great importance of a clean enucleation, which should take care of a prostatic carcinoma occulta. We give estrogen to all patients with carcinoma of the prostate except those with demonstrable solitary carcinoma occulta; these are watched carefully after the operation. We are convinced that the urologist should check all carcinomas of the prostate once a month and that, for the first year, all benign hypertrophied areas should also be checked as often. After the first year an occasional periodic health examination is all that is necessary if the lesion remains benign, but the patient should be warned to return at once if he has hematuria or any other untoward symptom. We try to accept the disappointments, and hope for a spectacular breakthrough in the future.

RÉSUMÉ

Le carcinome de la prostate est l'une des affections qui, en raison de leur prédominence et du danger qui leur est inhérent—requiert un maximum d'effort en vue de leur interprétation et de leur traitement. Le diagnostic est souvent incertain, en dépit de la pléthore des méthodes modernes d'investigation. L'auteur estime que l'urologue devrait—une fois la lésion identifié et l'opération pratiquée—contrôler l'état de chacun de ses malades au moins une fois par mois au cours de la première année qui suit, après quoi il suffira de pratiquer un contrôle de son état général de temos en temps.

RESUMEN

El carcinoma prostático es una enfermedad que, debido a su frecuencia y a la gravedad que supone, requiere el máximo esfuerzo para comprenderla y tratarla. A menudo el diagnóstico es difícil, a pesar de todos los métodos diagnósticos modernos. En la opinión del autor después de la identificación de la enfermedad y de la operación el urólogo debería ver al enfermo al menos una vez al mes durante el primer año, y después comprobar su salud en general de vez en cuando.

RIASSUNTO

Il cancro della prostata e' una di quelle malattie che, per la sua frequenza e per i rischi che comporta, richiede il massimo sforzo di comprensione e di cura. La stessa diagnosi dell'affezione e' spesso imbarazzante a dispetto del gran numero di moderni metodi di indagine. L'autore ritiene che l'urologo, fatta la diagnosi ed eseguito l'intervento, debba ricontrollare le condizioni del paziente almeno una volta al mese per un anno, dopo di che bastera' una visita generale saltuariamente.

ZUSAMMENFASSUNG

Der Prostatakrebs gehört zu den Krankheiten, die wegen ihrer Häufigkeit und wegen der ihnen innewohnenden Gefahren äusserste Bemühungen hinsichtlich ihres Verständnisses und ihrer Behandlung erfordern. Trotz der Fülle moderner diagnostischer Hilfsmittel ist die Erkennung des Prostatakrebses häufig unsicher. Die Verfasser glauben, dass, nachdem die Erkrankung erkannt und operiert worden

ist, für die Dauer eines Jahres mindestens einmal im Monat eine Nachuntersuchung jedes Patienten seitens des Urologen erfolgen sollte. Danach genügen gelegentliche Kontrollen des allgemeinen Gesundheitszustandes des Patienten.

BIBLIOGRAPHY


Alyea, E. P.: J. Urol. 53:143, 1945.

Baker, W.: Discussion of Carcinoma of the Prostate, Symposium, S. E. Section, A. Urol. A., 1958.

Boyd, M. L., and Muckolls, J. B.: Carcinoma of the Prostate, J. M. A. Georgia 29:493-499, 1940.

Bumpus, H. C. Jr.: Radium in Cancer of the Prostate; A Report of Two Hundred and Seventeen Cases, J.A.M.A. 78:1374-1376, 1922.

Cancer Illness Among Residents in Atlanta, Georgia; Cancer Morbidity Series-No. 1, 1950. Public Health Service Publication No. 13. United States Government Printing Office, Washington, D.C.

Colston, J. A. C., and Brendler, H.: Endocrine Therapy in Carcinoma of the Prostate: Preparation of Patients for Radical Perineal Prostatectomy, Tr. Am. A. Genito-Urin. Surgeons 38:241-256, 1946.

Deming, C.: The Correlation of Clinical Experience and Heterologous Growth of Human Prostatic Cancer, J. Urol. 61:281-290, 1949.

Ferguson, R. S.: Diagnosis and Treatment of Early Carcinoma of the Prostate, J. Urol. 37:774-782, 1937.

Fergusson, J. D.: Lancet 2:551, 1946; Postgrad. M. J. 24:312, 1945; Proc. Roy. Soc. Med. 47:45, 1954.

Flocks, R. H.; Harness, W. N.; Todor, J. M., and Prendergast, L.: Treatment of Carcinoma of the Prostate, J. Urol. 66:393-407, 1951.

Flocks, R. H.: Personal communication.

Greevy, C. D.: The Diagnosis and Treatment of Early Carcinoma of the Prostate, J.A.M.A. 120:1102-1105, 1942.

Gutman, E. B., and Gutman, A. B.: An "Acid" Phosphatase Occurring in the Serum of Patients with Metastasizing Carcinoma of the Prostate Gland, J. Clin. Investig. 17:473-478, 1938.

Hinman, F. Jr., and Hinman, F.: Occult Prostatic Carcinoma Diagnosed upon Transurethral Resection, J. Urol. 62:723-729, 1949.

Huggins, C.: Effect of Orchiectomy and Irradiation on Cancer of the Prostate. Ann. Surg. 115:1192-1200, 1942. Anti-Androgenic Treatment of Prostatic Carcinoma in Man; Approaches to Tumor Chemotherapy. Washington D.C.: American Association for the Advancement of Science, 1947, pp. 379-383.

Huggins, C.; Scott, W. W., and Dodges, C. V.: Studies on Prostatic Cancer: III. The Effects of Fever, Desoxycorticosterone, and Estrogen on Clinical Patients with Metastatic Carcinoma of the Prostate, J. Urol. 46:997-1006, 1941.

Jewett, H. J.: Radical Perineal Prostatectomy for Cancer of the Prostate: An Analysis of 190 Cases, J. Urol. 61:277-280, 1949.

Nesbit, R. M., and Baum, W. C.: Endocrine Control of Prostatic Carcinoma: Clinical and Statistical Survey of 1,818 Cases, J.A.M.A. 143:1317-1320, 1950. Serum Phosphatase Determinations in Diagnosis of Prostatic Cancer: A Review of 1,150 Cases, ibid. 145:1321-1323, 1951.

Pratt-Thomas: Personal Communication.

Scott, W. W., and Parlow, A. L.: Evaluation of Hormonal Therapy Followed by Radical Prostatectomy on Selected Cases of Advanced Prostatic Cancer, J. Urol. 65:1091-1107, 1951.

Scott, W. W., and Vermeulen, C.: Studies on Prostatic Cancer. V. Excretion of 17-Ketosteroids, Estrogens and Gonadotropins Before and After Castration, J. Clin. Endocrinol. 2:450-456, 1942.

Thompson, G. J.: Transurethral Resection of Malignant Lesions of the Prostate Gland, J.A.M.A. 120:1105-1109, 1942.

Young, H. H., and Davis, D. M.: Young's Practice of Urology. Philadelphia: The W. B. Saunders Company, 1926, vol. 1, pp. 621-631 and p. 634.


In the literary world people are friendly only to their inferiors, and the rising man has everybody against him. This universal jealousy increases tenfold the chance of mediocrities, who arouse neither envy nor suspicion. Like moles, they work their way underground, and, with all their incompetence, find more than one snug corner in the official lists, while really able men are struggling and blocking each other at the door of promotion.

—*Balzac*

# Electron Microscopic Studies of Stones of the Urinary Tract

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*The author presents a detailed study of the components of urinary calculi with the aid of the electron microscope. The results obtained with this instrument as compared with those obtained with the ordinary light microscope are described. Chemical analysis of the stones was also done, as was an investigation of the presence of bacteria within the calculi. It is concluded that bacteria may actually perform a significant role in the formation of stones in the urinary tract.*

THERE are still many questionable points concerning the structural figures of urinary stones. It goes without saying that both chemical constituents and structural figures must be known. In this article I shall report some of the results obtained in studies along this line, with the aid of electron microscopic procedures, up to the time of writing.

The larger stones were cut in two at the middle, and chemical analysis of the central portion and outer shell or, when necessary, of all the layers was carried out. A portion of the stone was crushed in an agate mortar, sprinkled and studied electromicroscopically.

Finely powdered, the stone appears to consist of minute particles under the ordinary light microscope, but these particles demonstrate definite shapes under the electron microscope. Although few substances resembling organic material were observed, pure chemical substances and their corresponding substances in the stones were studied comparatively under similar conditions and at a magnification of 3,500. The stones used in this study were as indicated in Table 1. Analysis has been carried out by Furukawa, one of the staff members of my department.

The majority of the minute particles of pure calcium phosphate are about 0.02 micron in diameter and irregularly shaped, occasionally with thin edges. Their shadow is dark (Fig. 1 *A*). Although calcium phosphate in stones simulates this general picture, as demonstrated in Figure 1 *B*, the edges are round, indicating minute irregularities differing from the irregularity of the pure chemical substance. Pure calcium oxalate is irregularly shaped, with a "round feel," and the edge is smooth (Fig. 1 *C*). The shadow is very dark, even if the particles are small. Calcium oxalate in stones are similar (Fig. 1 *D*).

Powder grains of pure uric acid take a triangular or polygonal form. The edges are relatively smooth or show minute angular irregularities and sometimes appear dim. The shadows are generally dim, and even the large ones are not necessarily dark (Fig. 1 *E*). Those of the stone, as shown in Figure 1 *F*, demonstrate the same characteristics. This is but an outline

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description of the chief components; there are exceptional cases also. The components of stone 2 are indicated in Table 1, and their shapes are characteristic, resembling that of a pomegranate (Fig. 1 *G*). Chemically, stone 3 is composed of a mixture of phosphate and oxalate, but electromicroscopically the separated particles are small and oval and have pores in the center (Fig. 1 *H*). The causal factor that produces such specific forms awaits future study.

The stones were then dissolved in various solvents, and the organic substances in the constituents were examined. A small part from the stone (diameter 0.3 to 0.5 cm.), which is to be analyzed, is washed three times in sterile distilled water and then placed in a sterile tube containing 5 or 10 cc. of 20 per cent carzol (in some cases another solution was used). This tube is kept in an incubator for forty-eight hours at 37 C. Most of the stones after this procedure will have lost their macroscopic structure and will have melted, but if they have not they are kept longer in the incubator. The solution is equally mixed, and 1 cc. of the mixture with 4 cc. of sterile distilled water is placed in a centrifuge tube and centrifuged at 3,000 r.p.m. for ten minutes. The supernatant fluid is discarded, and the sediment is then mixed with distilled water and again centrifuged. After this has been done four times, the carzol is removed from the sediment. Two cc. of distilled water is added to 0.2 cc. of sediment, 1 drop is placed on a grid by means of a capillary pipette. After thirty seconds or one minute, unnecessary liquid is removed with a filter paper. After it dries under the electron microscope, photographs of necessary spots are taken. The magnification used for these plates was 3,500.

TABLE 1

| Number | Sort | Phosphoric Acid | Oxalic Acid | Uric Acid | Carbonic Acid | Ammonia | Magnesium | Others |
|---|---|---|---|---|---|---|---|---|
| 1 | Renal | + | + | − | − | − | − | |
| 2 | Vesical | ++ | + | ++ | − | + | − | |
| 3 | Vesical | ++ | + | − | − | − | − | |
| 4 | Vesical | ++ | − | + | − | + | − | |
| 5 | Vesical | ++ | − | ++ | − | + | + | |
| 6 | Vesical | ++ | − | − | + | + | − | |
| 7 | Vesical | ++ | + | + | − | + | − | |
| 8 | Renal | ++ | + | + | + | + | + | |
| 9 | Renal | + | + | − | − | + | − | |
| 10 | Renal | ++ | + | + | + | + | − | |
| 11 | Renal | − | − | − | − | − | + | cystine |
| 12 | Renal | − | + | − | − | − | + | ++ |
| 13 | Vesical | + | − | + | − | − | − | |
| 14 | Vesical | + | + | + | − | − | + | |
| 15 | Vesical | ++ | + | + | − | + | + | |
| 16 | Renal | ++ | − | + | − | − | − | |
| 17 | Renal | + | + | + | − | − | − | |
| 18 | Vesical | + | + | ++ | + | + | + | |
| 19 | Renal | + | − | − | − | − | + | |
| 20 | Vesical | ++ | + | ++ | + | − | − | |
| 21 | Renal | + | ++ | + | − | − | − | |
| 22 | Renal | + | − | − | − | − | − | |
| 23 | Renal | − | − | ++ | − | − | − | |
| 24 | Vesical | + | + | ++ | − | − | − | |

Some remarks will be made on the specific suspensions of the stones; as is shown in Figure 1 *I*, a membrane-like substance is observed. Sometimes interlacing bundles of fibers are seen in the center, and in the surrounding area scattered spots are detected. The aforementioned membrane is extremely thin and cannot be observed under the ordinary light microscope. Consequently, further studies are necessary in order to clarify its origin. When pure cystine is exposed under a strong electronic beam, it shrinks at once or dissolves and becomes round, and sometimes its shadow becomes dim (Fig. 2 *A*). On the other hand, so-called cystine stones are as shown in Figure 2 *B*, and when exposed under a strong beam they change in appearance, as in Figure 2 *C*. They are

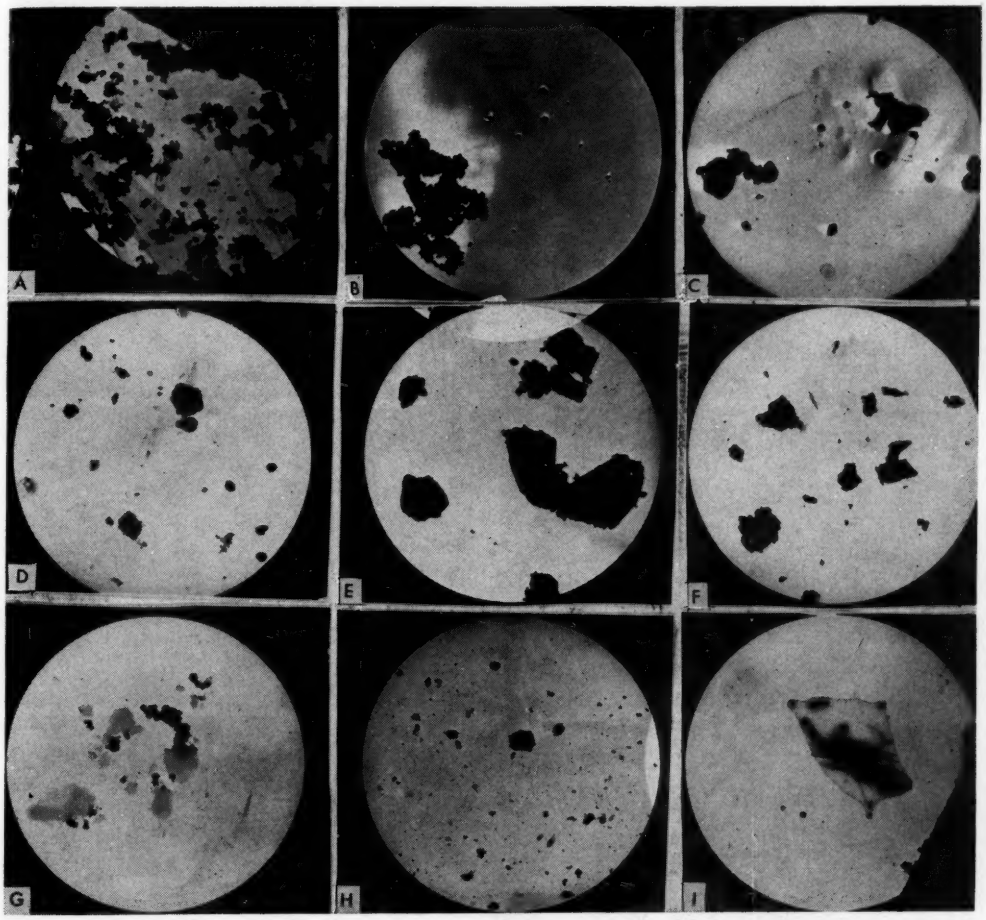



Fig. 1.—See text.

not absolutely identical, however, with the chemically pure ones. According to Harada and his associates, the stones contain a large amount of chondroitin substance resembling sulfuric acid. In the chemically pure ones the rather large particles, as in Figure 2 *D*, change their shapes, forming bubbles, while the small ones change into dim oval shadows with spotty shadows inside, shown in Figure 2 *E*. Although those with bubbles or small particles (Fig. 2 *F*) can also be found in the stones, they are only infrequently encountered. One must also keep in mind that the suspensions contain blood corpuscles.

The membranes of hemolyzed corpuscles are shown in Figure 2, *G*, *H* and *I*. The stones contain what Man-I calls Type I and Type III. It is assumed that many other deformed constituents are present but cannot be directly demonstrated, owing to the covering crystalloid.

With the electron microscope we have frequently observed particles resembling epithelial cells of the urinary tract, some

of which were covered with crystalloid (Fig. 2 *J*).

The epithelial cells of the urinary tract in the urine were then examined under the electron microscope. Under a magnification of 2,300 times, as shown in Figure

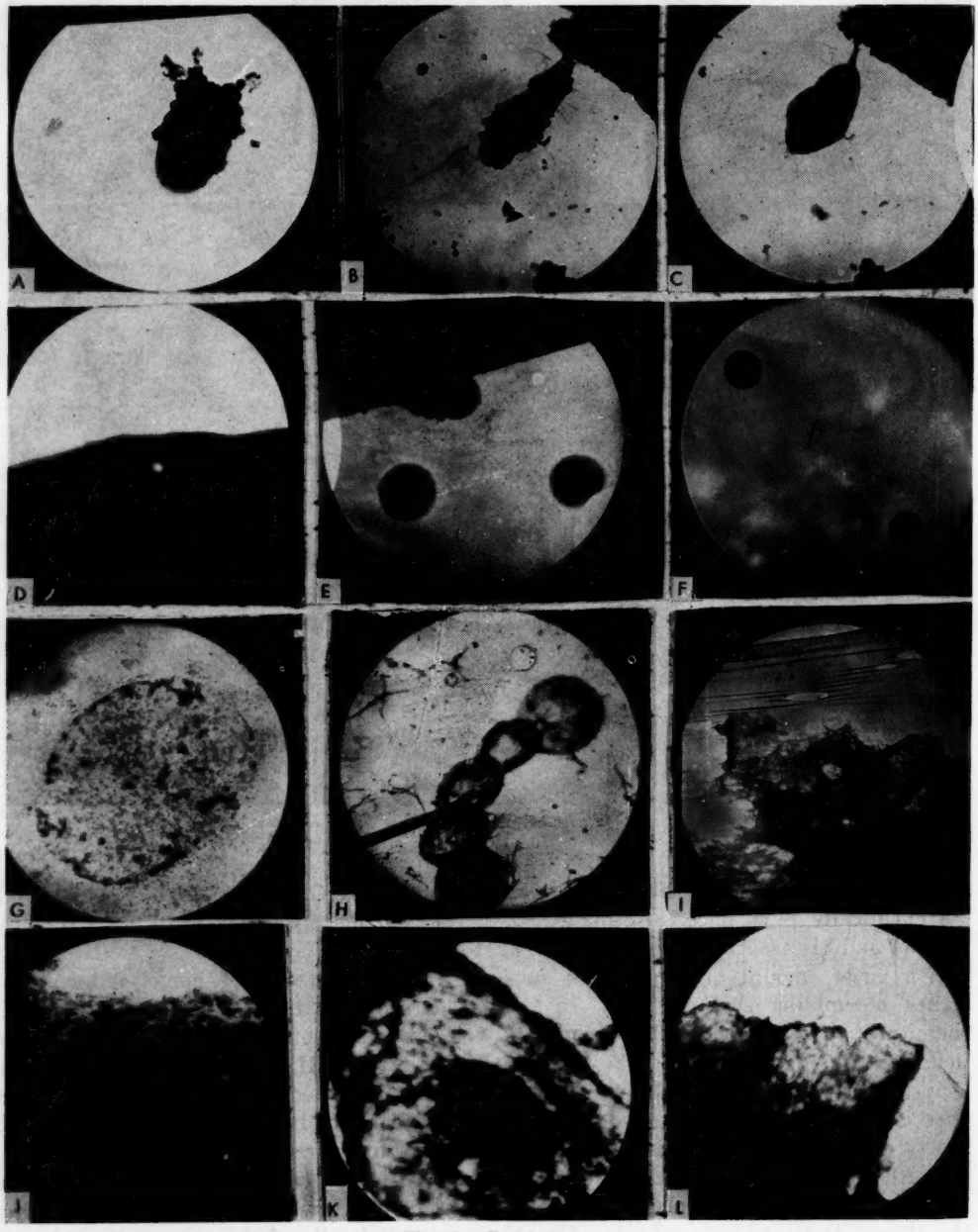



Fig. 2.—See text.

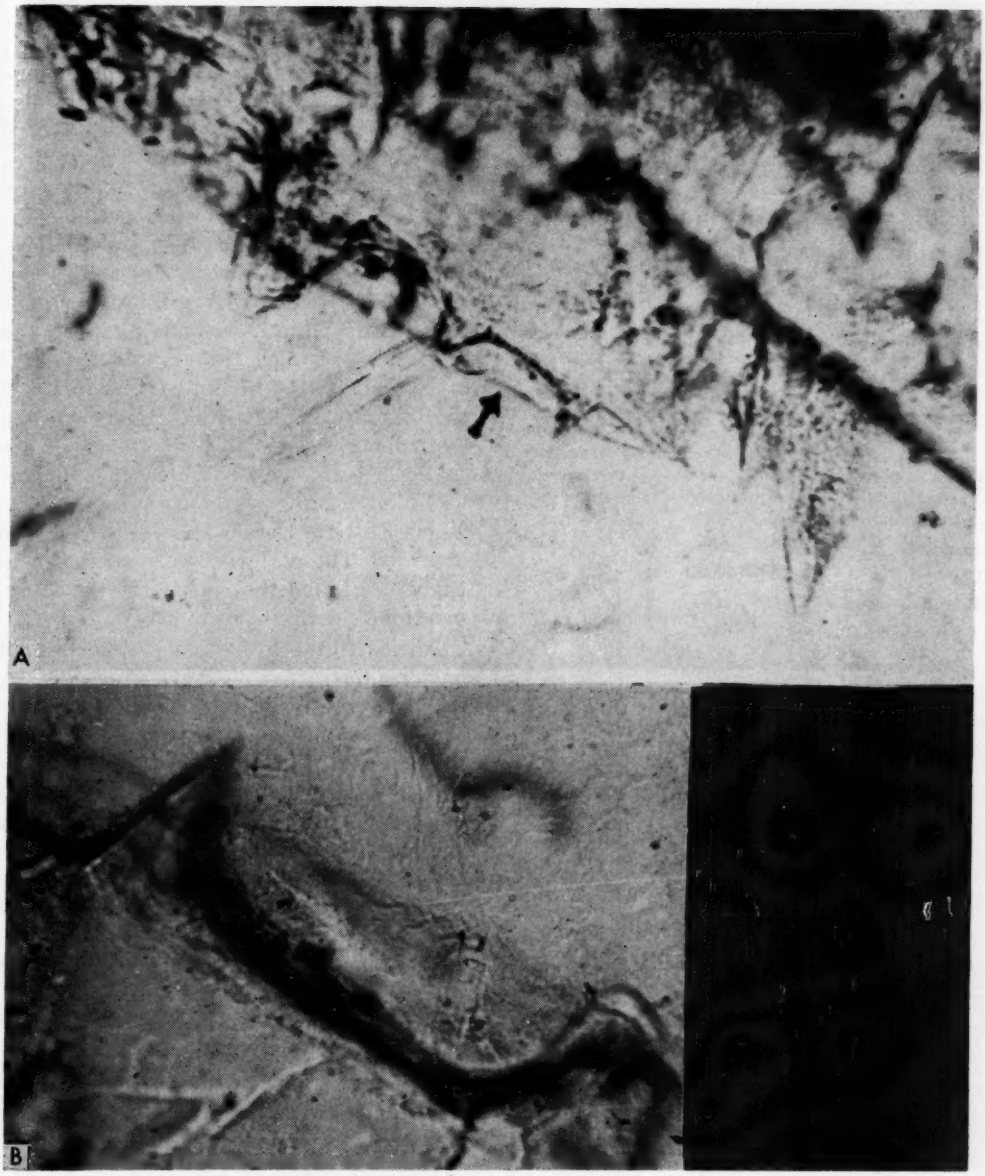



Fig. 3.—See text.

2 *K*, the nucleus projects a dark, angular ovoid shadow. The protoplasm, magnified 3,500 times, contains a relatively thick, small net-framed membrane-like substance identical to that observed in stones (Fig. 2 *L*). Furthermore, since such relatively well-preserved epithelial cells have been observed in stained specimens of the pre-

cipitate of dissolved stones, the condition and localization of these cells in the stone were determined by staining with hematoxylin and eosin. A portion near the center of the stone is stained in similar fashion, but not too clearly. In the periphery, however, there were portions that could be clearly detected, and it was noted that the cells were sometimes beautifully arranged between the crystalloids, with hardly any change in shape (Fig. 3, *A* and *B*). Platelike, relatively thick membrane-like particles, as shown in Figure 4 *A*, were frequently observed. There seemed to be an abundance, in portions, of phosphoric acid stones, which are not readily dissolved (Fig. 4 *B*). As Saito and others have mentioned, the particles most frequently observed in the precipitates of the solvents are the so-called netlike substances. Under the electron microscope, some of these are thick fibers and others are fine fibers, and they are either entangled among minute crystalloids or fill the interstices between the crystalloids. Figure 4 *C* shows the thick fibers, Figure 4 *D* the thin fibers, and pores from which the crystalloids seemed to have fallen off are found in both. We also observed a spider-web-like organic structure (Fig. 4 *E*), which Ebstein, Keyser and Tsuji have also observed. The majority were as shown in Figure 4 *F*, and they belong to the aforementioned netlike substances.

TABLE 2.—*Two Hundred and One Cases of Urinary Stones During the Past Three Years*

| | | | |
|---|---|---|---|
| Patients with urinary infection at the first inspection | | | 51 (25.3%) |
| Bacilli | 6 | cases | 11.8% |
| Cocci | 33 | cases | 64.7 |
| Bacilli + cocci | 10 | cases | 19.6 |
| Tubercle bacilli | 2 | cases | 3.9 |
| Total | 51 | cases | |

TABLE 3.—*Types of Stone and Bacteria*

| *Renal Stones* | | | *Vesical Stones* | | |
|---|---|---|---|---|---|
| *Number* | *Bacilli* | *Cocci* | *Number* | *Bacilli* | *Cocci* |
| 1 | + | − | 1 | − | − |
| 2 | − | − | 2 | − | − |
| 3 | + | − | 3 | − | − |
| 4 | − | − | 4 | − | − |
| 5 | − | − | 5 | + | + |
| 6 | − | − | 6 | − | − |
| 7 | + | − | 7 | − | − |
| 8 | + | − | 8 | − | − |
| 9 | + | + | 9 | − | − |
| 10 | + | − | 10 | − | + |
| 11 | − | + | 11 | − | + |
| | | | 12 | + | + |
| | | | 13 | − | + |
| Total | 11 cases | | Total | 13 cases | |

Total 24 cases

Bacilli 5 cases
Cocci 4 cases 12 cases
Both 3 cases

Although there are some reports that bacteria have been observed in the stones, the incidence in general seems to be very low. According to Chute, however, the detection rate of bacteria from the urine of persons with stones is 75 per cent, and Hori, after examining 201 patients during the past three years at this clinic, has detected bacteria in 25.3 per cent (Table 2).

The frequency of bacteria seems to be quite high, whether they are present in the central portion or in the outer shell. Stones were examined under the electron microscope for bacteria, and in 12 of 24 cases the results were positive (Table 3).

Although the central portion and the outer shell were examined separately in only 8 cases, bacteria seem to be more frequently found in the outer shell. In 2 cases, however, bacteria were more abundant in the central portion, nearly forming a colony as in Hellström's case. The outer shell of the same stone demonstrated only a few bacteria. The reason for the low detection rate with the methods hitherto

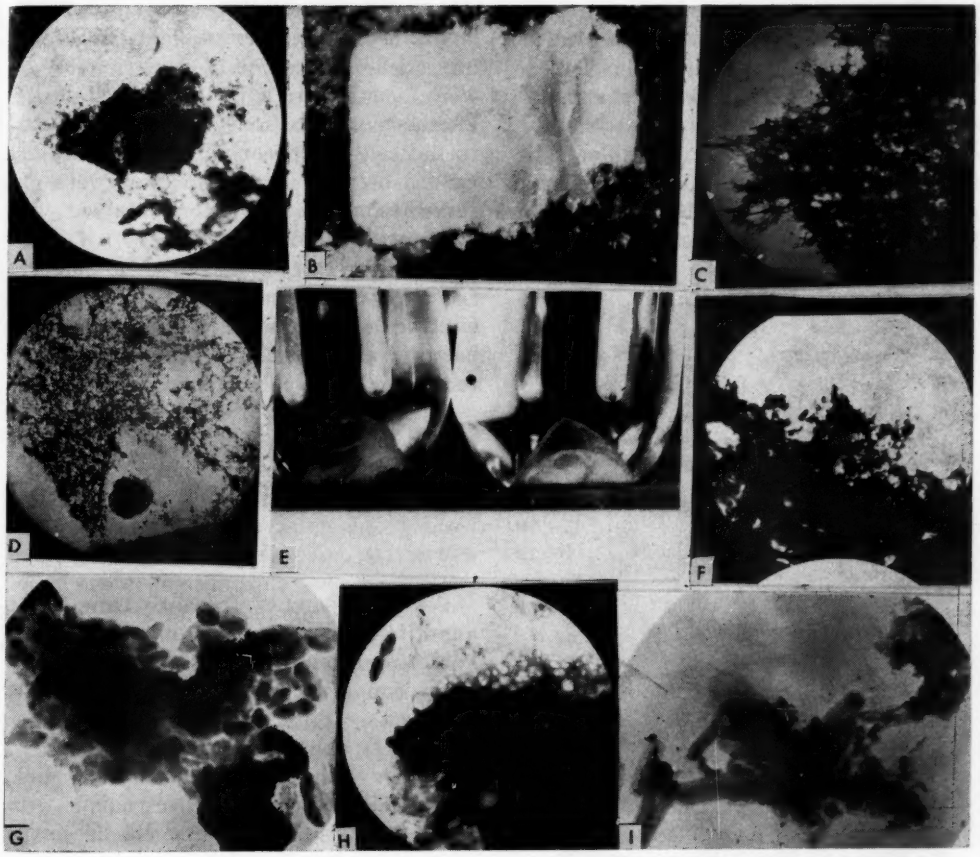



Fig. 4.—See text.

employed may be the deformity of bacteria in old stones and their poor staining capacity. Although it is only natural to assume that the stones are formed by the adhesion of crystalloids to the bacteria, Figure 4 *I* demonstrates the fact that the crystalloids are attached in the form of the bacteria. Such a portion can be observed only as a dim, red, netlike substance with the Gram stain, Schiff or Fuelgen reaction. When my ultrashort wave combined method is compared with the ordinary solution method, it can be noticed grossly that the former (O mark) is well dissolved (Fig. 5 *A*). The solvents, when observed under the electron microscope, are mostly thin membrane-like or netlike substances (Fig. 5 *B*), while in the control most of the solvents are relatively thick, as is shown in Figure 5 *C*.

## SUMMARY

Under the electron microscope the simple chief components of a minimum amount of stone powder may be readily clarified. For some unknown reason, however, they seem to differ somewhat from the chemically pure substances.

Chrondroitin sulfuric acid demonstrates

a set pattern under the electron microscope, and identical ones were detected in the stones.

A membrane-like substance, the membrane of blood corpuscles, a plate-shaped membrane-like substance, a netlike substance and epithelial cells of the urinary tract, which can be detected only under the electron microscope, were observed in the stones. These substances appeared in layers between the crystalloids, filled the interstices of the minute crystalloids, or were entangled with the crystalloids. Furthermore, portions in which the epithelial cells of the urinary tract were arranged between the crystalloids were observed in specimens of stones stained with hematoxylin and eosin.

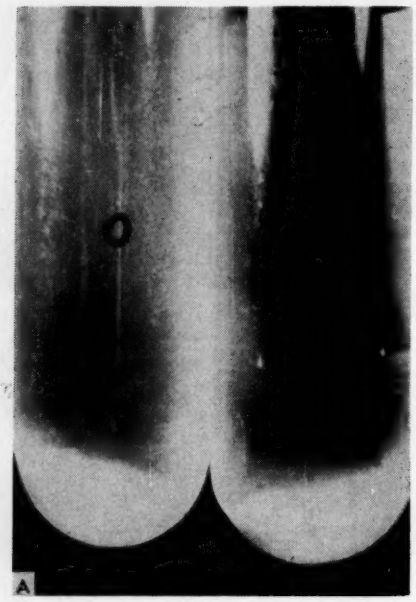
Since the rate of detection of bacteria from stones is much increased under the electron microscope, it is considered that bacteria play an important role in the formation of stones.

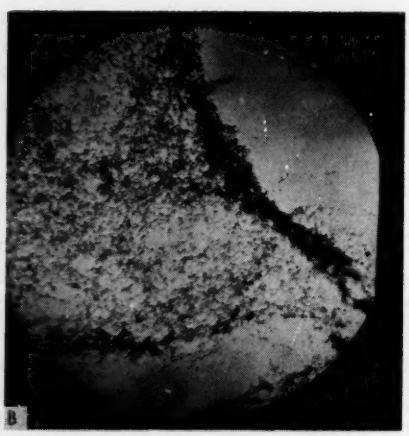
The acceleration of stone dissolution by the author's ultrashort wave combined method may be related not only to the speed of dissolution but to other problems.

RÉSUMÉ

Les principaux composants d'une faible quantité de poudre de calculs peuvent être analysés au microscope électronique. Mais étant donné certaine cause inconnue, ils semblent se différencier quelque peu des substances chimiquement pures.

L'acide sulfurique chondroitique présente, au microscope électronique, un schéma déterminé; il en a été décelé de semblables dans l'analyse des calculs.



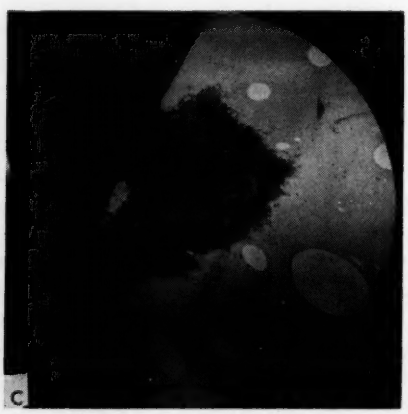




Fig. 5.—See text.

La substance membranoïde, la membrane des corpuscules sanguins, la substance lamelliforme membranoïde, la substance en forme de réseau et les cellules épithéliales du tractus urinaire, qui ne peuvent être décelées qu'au microscope électronique, ont été observées dans les calculs. Ces substances apparaissaient en couches entre les cristalloïdes, ou bien remplissaient les interstices des minuscules cristalloïdes, ou encore étaient enchevêtrées avec les cristalloïdes. De plus, des fragments dans lesquels les cellules épithéliales du tractus urinairt étaient disposés entre les cristalloïdes, ont été observés dans les échantillons de calculs colorés à l'hématoxyline et éosine.

Le taux de détection des bactéries des calculs ayant largement augmenté grâce au microscope électronique, l'on peut considérer actuellement que les bactéries jouent un rôle important dans la formation des calculs.

L'accélération de la dissolution des calculs par la méthode combinée des auteurs aux ondes ultracourtes, peut être reliée non seulement à la rapidité de dissolution mais aussi à d'autres problèmes.

ZUSAMMENFASSUNG

Die einfachen Hauptbestandteile einer minimalen Menge pulverisierter Harnsteine lassen sich unter dem Elektronenmikroskop leicht klarmachen. Aus irgendwelchen unbekannten Gründen scheinen sie sich jedoch von den chemisch reinen Substanzen zu unterscheiden.

Die Chondroitinschwefelsäure zeigt ein bestimmtes Muster unter dem Elektronenmikroskop, dasselbe Muster konnte in den Steinen erkannt werden.

Die membranartige Substanz, die Membran von Blutkörperchen, plattenförmige membranartige Substanzen, netzförmige Substanzen und Epithelzellen des Harnkanals, die unter dem Elektronenmikroskop entdeckt werden können, liessen sich auch in den Steinen beobachten. Diese Substanzen erschienen in Lagern zwischen den Kristalloiden oder füllten die Zwischenräume zwischen kleinsten Kristalloiden oder waren mit den Kristalloiden verstrickt. Ferner liessen sich in mit Hämatoxylin und Eosin gefärbten Steinpräparaten Abschnitte erkennen, in denen die Epithelzellen des Harnkanals zwischen den Kristalloiden gelagert waren.

Da die Rate der Entdeckung von Bakterien aus dem Steinmaterial unter dem Elektronenmikroskop erheblich ansteigt, wird angenommen, dass die Bakterien bei der Steinbildung eine wichtige Rolle spielen.

Die Beschleunigung der Steinauflösung durch die kombinierte Ultrakurzwellenmethode des Verfassers lässt sich nicht nur mit der Geschwindigkeit der Auflösung sondern auch mit anderen Problemen in Beziehung setzen.

RIASSUNTO

Per mezzo del microscopio elettronico possono essere chiaramente osservati i principali componenti semplici dei calcoli ridotti in polvere. Essi sembrano, tuttavia, differire per certi aspetti dalle sostanze chimicamente pure per qualche ignota ragione.

L'acido condroitinsolforico dimostra al microscopio elettronico un disegno identico a quello che si rinviene nei calcoli.

Nei calcoli e' stato possibile osservare le sostanze a tipo di membrana, le membrane dei globuli samguigni, le sostanze a rete e le cellule epiteliali delle vie urinarie. Queste sostanze si dispongono a strati fra i cristalloidi, o riempiono gli interstizi fra i piu' minuti cristalloidi o si trovano nell'interno dei cristalloidi. Inoltre e' stato possibile osservare cellule epiteliali stratificate fra i cristalloidi in preparati di calcolo colorati con ematossilina-eosina.

La frequenza di reperti batterici nell'interno dei calcoli, alla osservazione

ultramicroscopica, fa pensare che i batteri abbiano una parte importante nella genesi dei calcoli.

L'accelerazione della dissoluzione dei calcoli, ottenuta con il metodo delle onde ultracorte, puo' essere messa in rapporto con molti importanti problemi.

SUMARIO

Ao microscópio eletrônico, os simples componentes principais de uma quantidade minima de pó de calculos podem ser rápidamente clarificada. Devido á qualquer causa desconhecida, parecem, no entanto diferir, das substâncias quimicamente puras.

O acido condroitin-sulfurico apresenta um determinado aspecto sob o microscópio eletrônico, idêntico as encontrado nos caleulos.

As substâncias tipo membranas de corpusculos sanguineos, as em forma de prato, as em forma de rêde e celulas epiteliais do tráto urinário, observaveis sómente no microscópio eletronico, foram encontradas nos calculos. Estas substâncias apareceram em forma de camadas entre os cristaloides ou encheram os intersticios de cristaloides minusculos ou incrustados nos mesmos. Alem do mais, porções nas quais as celulas epiteliais do tráto urinário estavam organizadas entre cristaloides, foram observadas nos especimens de calculos corados com hematoxilina e eosina.

Desde que o grau de detecção de bacteria em calculos aumenta ao microscópio eletrônico considera-se que as bacterias tenham um importante papel na formação dos mesmos.

A aceleração da dissolução de calculos pelo método combinado de ondas ultrascurtas do A. pode ser relacionado não sómente á velocidade de dissolução como á outros problemas.

RESUMEN

Los componentes elementales principales de una mínima cantidad de polvo de piedra pueden ser facilmente clarificados por medio del electromicroscopio. De todas maneras parece ser que, debido a alguna causa desconocida, difieren en alguna manera de las sustancias químicas puras.

El acido condroitinosulfúrico muestra una serie de características, idénticas a las demostradas en algunas piedras, a la observación electromicroscópica.

También en los cálculos se han identificado la sustancia membranoide, la membrana de los globulos sanguineos, la sustancia reticular y células epiteliales urinarias mediante el uso del electromicroscopio. Tales sustancias se presentan en capas entre los cristaloides, o llenan los intersticios o aparecen mezcladas con los cristaloides. Y mas aún, en preparaciones de cálculos teñidos con hematoxilina y eosinase han observado porciones en las que las células epiteliales del epitelio urinarioaparecen organizadas por entre los cristaloides.

Todo vez que con el elecromicroscopio se descubre mayor cantidad de bacterias en estas preparaciones se considera que tales bacterias pueden jugar un papel muy importante en la génesis de los cálculos.

La aceleración de la disolución de los cálculos por el método combinado de ondas extracortas aconsejado por el autor puede tener relación no solo con la velocidad de esta disolución sino con otros problemas.

REFERENCES

1. Chute, R., and Suby, H. I.: Prevalence and Importance of Splitting Bacterial Infections of the Urinary Tract in the Formation of Calculi, J. Urol. 44:590, 1940.

2. Ebstein, W., and Nicolaier, P.: Arch. Path., Physiol. u. klin. Med. 143:337, 1896.

3. Harada, A.: On the Urinary Stone, Japanese M. J. 38:1571, 1954.

4. Keyser, L. D.: Southern M. J. 25:1031, 1932; J. Urol. 50:169, 1943; ibid. 54:194, 1945, and 59: 826, 1948.

5. Lett, H.: Brit. J. Urol. 8:205, 1936.

6. Saito, S.: Studies of Urinary Calculi: XI. Report on the Organic Substances in Urinary Calculi, Japanese J. Urol. 45:589, 1954.

7. Man, I. M.: Electron Microscopy 2:53, 1951.

8. Minami, T.: On the Urinary Calculi, Tokyo Jikei-kai Ikadai gaku Z. 71:117, 1955.

When we contemplate the miseries that have arisen from fanaticism, or fervid enthusiasm, although it is but a sad consolation, yet it affords some gratification in our charitable view of mankind, to think, nay to know, that this fearful state of mind is a disease, a variety of madness, which may in many instances be referred to a primary physical predisposition, and a natural idiosyncrasy. It is as much a malady as melancholy and hypochondriacism. In peculiar constitutions it grows imperceptibly. Lord Shaftesbury has made the following true observation: "Men are wonderfully happy in a faculty of deceiving themselves whenever they set heartily about it. A very small foundation of any passion will serve us not only to act it well, but even to work ourselves in it beyond our own reach; a man of tolerable goodnature, who happens to be a little piqued, may, by improving his resentment, become a very fury for revenge."

Thus it is with enthusiasm, a malady which in its dreadful progress has been known to become contagious, one might even say epidemic. Vain terrors have seized whole populations in cities and in provinces; when every accident that happened to a neighbour was deemed a just punishment of his sins, and every calamity that befel the fanatic was considered the hostile act of others. Jealousy and dark revenge were the natural results of such a state of mind, when the furious fire of bigotry was fanned by ambition until monomania became dæmonomania of the most hideous nature, and every maniac bore in his pale and emaciated visage the characteristic of that temperament which predisposes to the disease. Seldom do we observe it in the *sanguineous temperament*, remarkable for mental tranquillity, yet determined courage when roused to action. The *choleric* and *bilious*, impetuous, violent, ambitious, ever ready to carry their point by great virtues or great crimes, may no doubt rush into a destructive career; but then they lead to the onset the atrabilious, men saturated with black bile, and constituting the *melancholy temperament*. Here we behold the countenance sallow and sad; the visage pale and emaciated, of an unearthly hue; gloom, suspicion, hate, depicted in every lineament; the mirror of a soul unfitted for any kind sentiment of affection, pity, or forgiveness. Detesting mankind, and detested, they seek solitude, to brood upon their wretchedness, or to derive from it the means to make others as miserable as themselves.

—*Millingen* (circa 1837)

# Hydatid Cysts of the Brain

## A Study of Eight Cases

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HYDATID infestation is not infrequent in Turkey, which belongs partly to the Mediterranean sector. Statistics of the surgical clinics in Turkey on pulmonary, hepatic and other sites of the disease are closely comparable to those from South American clinics.

Although the incidence of cerebral echinococciasis is low compared to that in other affected areas, its occurrence is by no means exceptional. This article constitutes the first part of a study on echinococciasis of the central nervous system, observed at the Second Surgical Clinic of the University of Istanbul. It will deal only with forms localized in the brain. Hydatid cysts of the spinal cord will be the subject of another article.

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*Eight cases of hydatid cyst of the brain are reported. In the author's opinion the treatment is neurosurgical. The roentgenographic and encephalographic pictures are described and illustrated. Since the cysts are usually well advanced before the patient seeks treatment, the importance of careful and detailed study is emphasized.*

The information on hydatid disease presented in standard textbooks is not substantial. In the classic monograph by Cushing[1] on 2,000 brain tumors, only 2 cases of hydatid cysts of the brain are briefly described. Dandy[2] reserved only two pages to this subject in the neurosurgical chapter of *The Practice of Surgery* by Lewis. In the volume on pathology of the new monumental *Handbuch der Neurochirurgie,* two pages are devoted to it by Zülch,[3] whereas Mattos-Pimenta[4] contributes four pages in Volume 4/1. In the literature the most satisfactory data are presented by Paillas and Bonnal[5] in the *Encyclopedie Medico-Chirurgicale.* Other publications on this subject are restricted to occasional reports in periodicals.

A close analysis of this literature reveals that no standard methods have been elaborated for an accurate preoperative diagnosis and an effective operative treatment of this pathologic condition. The chances of the neurosurgeon, therefore, are more hazardous and less promising than are those of the general surgeon who deals with the same disease in the liver or the lung.

The purpose of this article is to review

and analyze 8 cases of cerebral hydatid cyst observed at the Second Surgical Clinic of the University of Istanbul and, if possible, to draw conclusions as to diagnosis and treatment. Other cases of hydatid cysts of the brain in Turkey have been reported in an article by Berkay.[6]

Cerebral forms of hydatid disease are caused by the larval stage of *Echinococcus granulosis* (Goeze, 1782). Clinically it is *Echinococcus multilocularis*. In my own cases I have never encountered *Echinococcus alveolaris*. The parasite enters the central nervous system by way of the blood stream (the pulmonary circulation). Parasites carried by the internal carotid artery are most often localized in the cerebral hemispheres or the ventricles, whereas, those arriving by way of the vertebral arteries are probably more frequently settled in the contents of the posterior fossa. On the other hand, it seems logical to presume that extradural deposits are caused by rupture of the intracranial cysts.

In cases of primary echinococciasis the parasite is obliged to pass through the capillaries of the liver and the lung after penetrating the intestinal wall and entering the portal venous circulation. The difficulty of this passage explains the difference of frequency between the hepatic (7.9 per cent) and the cerebral (1.4 per cent) localization of the disease (Dévé[7]). On the other hand, it does not supply a satisfactory explanation for the infrequency with which hepatic and pulmonary lesions coexist.

Among other parasites of the central nervous system, Cysticercus cellulosa is most often deposited in the cisternae and is multiple. On the contrary, multiple hydatid cysts are probably metastatic or due to recurrence. I have not yet encountered Cysticercus in Turkey, because most of the people are Muslims and do not eat pork.

A review of the literature indicates that the following authors have communicated substantial numbers of cases: In 1935 Morquio[8] reported 38 personal cases in Uruguay; Philipov[9] reported 15 cases in Bulgaria, and Goinard and Descuns[10] 30 cases in France. In 1944 Roger[11] estimated the number of reported cases at approximately 300.

*Material and Methods.*—All cases of hydatid cyst observed at the Second Surgical Clinic of the University of Istanbul between 1952 and 1959, inclusive, have been reviewed for the purpose of this study. The distribution of the disease in various organs was as follows:

| | |
|---|---|
| Lung | 38 |
| Liver | 96 |
| Kidney | 3 |
| Spleen | 2 |
| Brain | 8 |

Of the 8 cases of cerebral cyst, the lesions were located as follows:

| | |
|---|---|
| Intrahemispheric | 4 |
| Intraventricular | 2 |
| Cerebellopontile | 1 |
| Extradural | 1 |

In 1 case the lesion was metastatic, the primary cyst being in the lung. In another, a cyst of the temporal horn that was solitary at onset of the disease became multiple after subsequent operations.

In the literature, in a considerable number of reported cases, the patients were children. In this respect, the most prolific statistics available are those of Morquio,[8] who detected 38 hydatid cysts among 82 infantile brain tumors. In my cases, the patients ranged from 10 to 43 years of age, the average being 20.5. Five of them men and 3 were women.

*Clinical Study.*—In adults, hydatid cysts of the brain usually cause focal symptoms at onset and progress to a syndrome of intracranial hypertension. In children, on

the other hand, these two sets of symptoms coexist, the usual form being a dominant intracranial hypertension with minimal focal signs. If focal signs are present, location of the site is clinically simple. Among these localizing signs, the most informative is a slowly progressive motor disturbance.

The onset of the disease is usually characterized by flaccid hemiparesis with abolition of reflexes. This symptom progresses to spastic hemiplegia with a positive Babinski sign. Compared to these motor symptoms, disturbances of sensitivity are minimal and can be easily overlooked.

In the literature, much emphasis has been placed on the frequency of visual disturbances. Among them, hemianopsia is a valuable and localizing sign (Schroeder,[12] Goinard and Descuns[10]). On the other hand, when the cyst is situated in the hemispheres, the most revealing symptom is a focal cerebral seizure. Furthermore, it obliges the patient to seek medical aid at a comparatively early stage of the disease, owing to the discomfort it produces. These seizures have a tendency to be easily generalized.

Local tenderness of the skull, if present, is a sign obvious enough to give one an idea as to the location of the cyst.

In children, percussion of the skull may evoke McEvan's sign. In patients with disjunction of the cranial sutures, due to the presence of a hydatid cyst, Castex has noted and described a specific auditive sign. In the meantime, South American authors also describe a parchment-like bruit on auscultation when the bones of the skull are eroded by the cyst.

When insidiously progressive cases are submitted to medical examination, ocular signs, such as papilledema and/or optic atrophy, are usually present. In 1 of my personal cases a Foster-Kennedy syndrome was present.

Plain roentgenograms are not informative, except for signs of intracranial hypertension, and it is impossible to differentiate a hydatid cyst from a brain tumor on the sole basis of these images. Nevertheless, occasionally one is able to see a round, calcified hydatid mass. In my experience this has never occurred.

In children, disjunction of the suture lines is an early and obvious sign. The roentgenograms of small children show diffuse circumvolutional markings. At the same time, a honeycomb picture can be observed on the skull itself. Even in adults the intracranial hypertension is usually so intense that, in the majority of cases, the suture lines are separated as in children. On the other hand, surprisingly enough, psychic health is well preserved.

Cytologic and chemical studies of the blood in cases of cerebral hydatid disease are not revealing. The only sign observed, namely, eosinophilia, is not significant in tropical regions, because of the multiplicity of other parasites.

The cerebrospinal fluid is usually normal and does not show eosinophilia (Schroeder[12]). The only abnormality may be a slight or moderate degree of lymphocytic pleocytosis, which is never significant. Furthermore, lumbar puncture is extremely dangerous in these cases, because of the presence of intracranial hypertension.

The course of cerebral hydatid disease is insidious, slowly progressive and long-lasting. The brain itself is surprisingly resistant to the huge mass of the cyst. Toxic signs like urticaria, pruritus and epistaxis are seldom present. None of these has been observed in my cases.

*Diagnosis.*—I must confess that the exact diagnosis of cerebral echinococcus cyst, in a region where this parasite is exceptional, is quite impossible. The most a neurosurgeon can do is to diagnose a space-occupying lesion. As there seems to

exist no syndrome typical or diagnostic of cerebral hydatid cyst, the only way one can arrive at a preoperative diagnosis is to assume its presence in a patient who lives in a "hydatid region" and displays symptoms of brain tumor.

Casoni's intradermal test and the complement fixation test of Weinberg can be of diagnostic assistance in only 50 per cent of cases. I prefer the intradermal test for its simplicity as compared to the complement fixation test, which is expensive and time-consuming. On the other hand, Hoffman[13] finds a higher percentage of positive results, in proved cases, with Weinberg's reaction and reports that it is significant in showing whether or not the cyst is alive. Although Goinard and Descuns[10] attach no value at all to these reactions, my opinion is that, if the tests give positive results, they can be of diagnostic help, whereas negative results should by no means exclude the presence of hydatid disease. The coexistence of hepatic or pulmonary echinococcus and cerebral cyst is rare, but when it exists it can be shown on routine roentgenograms taken of every patient suspected of having brain tumor. In 7 cases of cerebral echinococcus treated by operation, Obrador[14] discovered 2 latent pulmonary hydatid cysts by postoperative roentgenographic control.

Ventriculograms, which are dangerous to the patient and therefore contraindicated, show images typical of space-occupying lesions without being specific for hydatid disease. On the other hand, if the brain needle pierces the wall of the cyst instead of the ventricular wall, an aerocystogram is obtained (Fig. 1). All patients with suspected cerebral echinococcosis are extremely poor candidates for air encephalographic study.

The cerebral angiogram seems to be the most faithful diagnostic aid. The images are characteristic for hydatid cysts: The region occupied by the cyst is absolutely avascular, and the vessels outlining the cyst are stretched, forming smooth curves and simulating strips encircling a spherical mass.

Fig. 1.—Circumvolutional markings in hydatid cysts.

*Electroencephalographic Study.*—Fuster, Gastaut and Castells[15] attach significance to a silent zone encircled by delta waves, but this may be valuable only in regions where hydatid disease is a common occurrence. In my series, I found that bioelectric asymmetry differing from alterations produced by destructive glioma was more frequent. It is absolutely impossible, however, to define a specific electroencephalographic pattern for cerebral hydatid cyst. Perhaps, if a dramatic picture with delta arrythmia and great amplitude, corresponding to a well-tolerated and long-lasting brain tumor, is observed, and if the biologic reactions of the same patient indicate echinococcus, one may be fairly sure of the presence of cerebral hydatid cyst.

## REPORT OF CASES

CASE 1.—M. I., a man 34 years old, was first seen at the Clinic in September 1952, when a round shadow due to a hydatid cyst in the apical segment of the right lung was noticed on roentgen control. Three months earlier, on two occasions, the patient had vomited clear liquid, and there had been an anaphylactic shock accompanied by urticaria.

He refused operation. Three months later he was admitted to the Clinic in a comatose state, as an "emergency case." Examination revealed, in addition to the coma, abolition of response to painful stimuli, punctiform pupils, total abolition of all reflexes, Cheyne-Stokes breathing and a thready pulse. He died three hours after admission.

Autopsy revealed 3 metastatic hydatid cysts in the right cerebral hemisphere and 4 in the left. The largest was about the size of a nut. Diffuse edema was noted in both hemispheres, and 1 of the cysts on the right was situated in the substance of the striatum.*

CASE 2.—H. C., a man 43 years old, was admitted to the Clinic in February 1953, complaining of headache, defective hearing and facial paralysis. Four months later he had first had severe headaches, followed in two months by the appearance of diplopia and, later, facial paralysis. He did not remember the time of onset of his auditory troubles, which were very slowly progressive. Examination revealed total deafness in the left ear.

Neurologic examination revealed vision of 6/12; left abducens paralysi fine nystagmoid jerks in the left horizontal position of the eyes and coarse jerks in the right horizontal position; hypoalgesia of the area innervated by the maxillary and mandibular branches of the trigeminal nerve; abolition of the corneal reflex on the left, and a glairy veil on the left cornea. The left hemiglossal area was hypoesthetic, and paralysis of the left pterygoid and left peripheral facial paralysis were also noted. After audiometric examination, the otologist reported deafness of the internal ear on the left. The caloric test evoked no reaction. The voice was coarse, and the soft palate did not contract well on the left side. Asymmetry of the left extremities, a bilaterally indifferent Babinski sign, an obvious Romberg sign with propulsion to the left, and a staggering gait were noted.

*This was the only case of multiple metastatic cysts in the series.

The lesion was tentatively diagnosed as an advanced tumor of the cerebellopontine angle, and surgical exploration was done. With the cerebellum retracted at the level of the lateral cisterna, a thin, white cystic formation, extending into the cisterna magna, was noted. This was thought to be an arachnoidal cyst; its hydatid nature was not suspected. During manipulation the cyst was perforated and its contents spilled out, at which time the presence of a number of daughter vesicles revealed its true nature. The inner aspect of the cyst was firmly attached to the wall of the pons, like an acoustic neurinoma.

The operative field was washed with saline solution and aspirated, and the wound was closed. Although the anesthetist reported the course of the operation, both during rupture of the cyst and thereafter, as normal, the patient never regained consciousness, and the pupils remained punctiform. On the evening of the day of operation the pulse was thready, and in spite of transfusions the systolic blood pressure remained low. The patient died twenty hours after the operation, in hyperthermia.

On postmortem examination, the impression of the cyst on the pons cerebri, which was pushed to the right, was observed, as were diffuse edema and congestion in the segment corresponding to the pressure caused by the cyst, and edema, congestion and petechial hemorrhages in both hemispheres.

In this case death was apparently due to the toxic effect of the spread of the cystic contents, although the immediate postoperative course was uneventful.

CASE 3.—A. Y., a boy 14 years old, was admitted to the Clinic in August 1953, complaining of rigidity of the left extremities, convulsive attacks in the left arm and seizures accompanied by deviation of the eyes. Five months prior to admission, severe headache had set in as the boy walked home after taking an extremely hot bath. With the use of analgesic drugs this headache subsided, but it never disappeared. After a few days it became continuous on the right side of the head and radiating toward the front. Four days later diplopia was observed. The patient was treated for "a touch of cold." The headache diminished, but the diplopia did not change. At the same time, vomiting occurred even though the boy ate little. One week after onset he was hospitalized (in a state hospital). The headache and the diplopia were treated

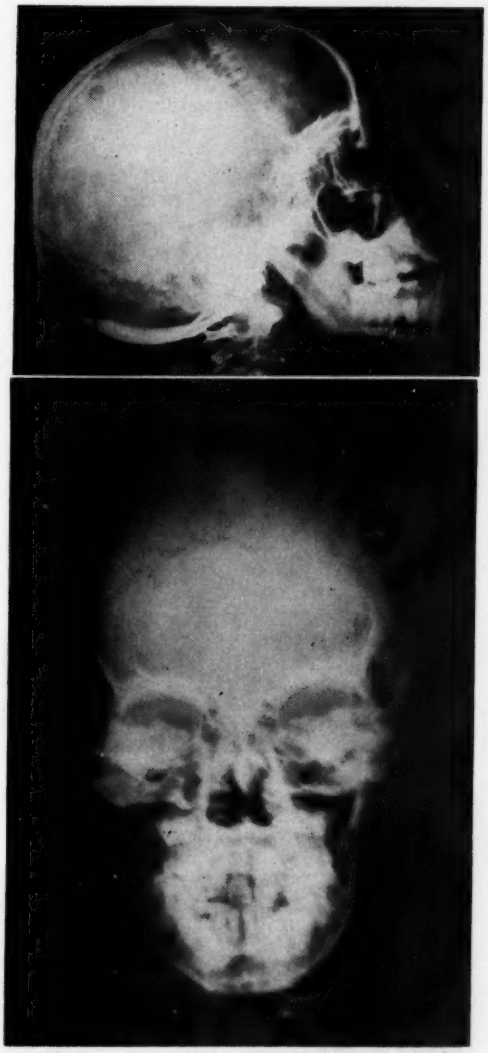
to some extent, but no diagnosis was made. The patient was then taken to two other clinics, staying ten days in each, and was sent to this Clinic with a diagnosis of tumor of the brain.

One week prior to this admission the boy had had a convulsive seizure, beginning in the left hand and the left corner of the mouth and ending with loss of consciousness. Such seizures occurred, in the beginning, only two or three times a day and lasted four or five minutes, but later they occurred more frequently and lasted longer.

Neurologic examination of the semicomatose patient revealed the following abnormalities: severe pain on percussion of the right temporal region; moderate rigidity of the head and neck; deviation of the body to the right; bilateral gross papilledema on ophthalmoscopic examination; ptosis of the right upper eyelid; moderate bilateral exophthalmia; deviation of the eyes to the right; left central facial paralysis; exaggerated and spastic reflexes, and a positive Hoffman's sign in the left upper extremity. The pinprick test evoked tremor, and the patient urinated involuntarily during examination for reflexes. The abdominal reflexes were absent. Those of the lower extremities were bilaterally exaggerated; the left leg was spastic, and clonus and Babinski's sign on the left were observed. During examination one of the typical seizures occurred, and the patient went into a state of decerebrate rigidity; he returned to normal, however, in a short time. In spite of all the treatment administered for cerebral edema, he died twelve hours after admission, in one of the seizures. At autopsy a hydatid cyst measuring 12 by 10 cm., extending from the right frontal pole to the caput nucleus caudatus and involving the internal capsule, was observed. Diffuse cerebral edema and congestion were also present.

CASE 4.—M. B., a girl 8 years old, was admitted to the Clinic in April 1956, complaining of headache, vomiting and diplopia of two months' duration. The symptoms first to appear were morning headache and projectile vomiting, followed promptly by diplopia. The child, an active and clever shepherdess, stated that the frontal headaches were aggravated by movement of her head.

Neurologic examination revealed bilateral advanced papilledema with blackouts of vision; left convergent strabismus; right peripheral facial paralysis, and diminution of the reflexes



Figs. 2 and 3.—Roentgenograms taken in Case 4, showing disjunction of suture lines.

in the extremities. The lower extremities were normal except for this diminution. Because of a large abdominal scar, the abdominal reflexes could not be elicited. The general condition was low and the gait staggering.

Plain craniograms revealed disruption of the suture lines and diffuse circumvolutional markings. Ventriculographic study was done. When the dura was incised through a burr

hole on the left, a white membranous mass protruded from the opening. Its appearance was typically that of a hydatid cyst. The burr hole was enlarged, the cyst-containing area isolated and the cyst aborted by injecting air into the right ventricle. The cyst was not ruptured.

Postoperatively the symptoms disappeared dramatically. The papillae returned to normal in four days. The cyst measured 4 by 6 cm. and contained numerous daughter vesicles.

CASE 5.—G. Y., a girl 13 years old, was admitted to the Clinic in December 1954 with

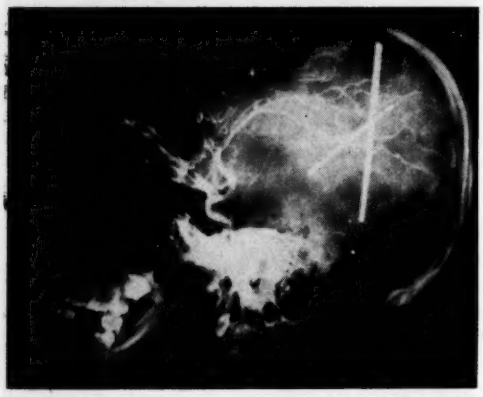


Fig. 4.—First roentgenogram taken in Case 6, showing typical left temporal space-occupying mass, which proved to be hydatid cyst in left descending horn.

Fig. 5.—Second angiogram taken in Case 6, showing local recurrence in ventricle.

euphoria, left facial paralysis, headache and occasional convulsive seizures. Four months earlier she had had such a seizure involving the right side of the body and the right extremities, accompanied by loss of consciousness. A few days after the first attack a second one occurred, causing asymmetry of the left side of the face. A gradual change of character, toward an abnormally joyful, elated attitude, was noted.

Neurologic examination revealed well-preserved sonorousness of the skull on percussion. The following abnormalities were noted: moria; anosmia on the right side; primary atrophy of the left optic nerve, and papilledema on the right. The vision was 6/12; the corneal reflexes were bilaterally absent, and central left facial paralysis was present. During the outstretched arm test, bilateral tremor and lateral falling of the right arm were observed. The reflexes were normal except for the abdominal reflexes, which were absent. There was occasional involuntary micturition.

On the ventriculogram the right ventricle could not be detected, and a space-occupying lesion, displacing the left ventricle laterally, was observed. During surgical exploration by means of a large frontal flap, clear liquid was ejaculated through a temporal incision. This was considered evidence of a subdural hydatid cyst. The flap was completed, and a hydatid cyst the size of an apple, obliterating the right ventricle and extending to the cortex, was extirpated.

The first two postoperative days were normal, and consciousness returned. Unfortunately, on the third day the patient died in deep hyperthermia. Permission for autopsy was refused. The cause of death was assumed to be the toxic effect of the cyst's contents on the brain.*

CASE 6.—M. K., a woman 21 years old, was first admitted to the Clinic in December 1955, with the following complaints: headache, blurred vision and slight right facial asymmetry. Six months earlier she had noticed retardation of her psychic reactions, as well as intermittent headache. Vomiting did not occur. During the past two months the vision had become blurred and asymmetry had developed at the right corner of the mouth. The headaches had become continuous and the patient mentally disturbed. She was overemo-

*Ever since this patient's case was observed, Casoni's test has been performed on every patient with a space-occupying lesion of the brain.

tional and complained of irritation at not being able to read and work as before.

Examination revealed tenderness of the left temporal area to percussion; exaggeration of the headache on movement of the head; bilateral papilledema and hemorrhage; peripheral narrowing of the visual fields; obvious right facial paralysis, and diminished abdominal reflexes on the right side.

Casoni's reaction was negative. An angiogram of the brain showed a space-occupying lesion in the left temporal region. At operation this area was noted to be abnormal in color and consistency, and a subcortica tumor was suspected. An incision was made in the cortex, and clear fluid poured out, revealing the true nature of the tumor. The incision was enlarged; the operative field was washed with saline solution, and a hydatid cyst as large as an apple was extracted from the substances of the left temporal horn. The postoperative course was uneventful, and the patient was discharged fifteen days after the operation.

In April 1957 she returned, complaining of headaches and convulsive seizures. During the year since the operation she had been asymptomatic, but recently, while taking a bath, she had had a convulsive seizure accompanied by torsion of the face and body to the right and loss of consciousness. The neurologist who examined her after this seizure attributed the attack to scarring and adhesions due to the former operation. Barbiturates were administered but did not improve her condition; headache became continuous, and the blurred vision returned, whereupon the patient, alarmed, returned to this Clinic for treatment.

Examination at that time revealed that the operative scar on the skull was healed and the flap tender to percussion. Bilateral papilledema was noted. I considered this due to the recurrence of the hydatid cyst. The patient refused cerebral angiographic examination. An electroencephalogram was taken, and in the left central region slow and sharp-slow arrythmia of moderate amplitude was detected. Reoperation was performed, and a cyst that filled the defect at the base of the flap, left after the first operation for decompression, was extirpated. At the same time two other cysts were observed filling the substance of the left temporal horn; these were also extracted without bursting. The patient recovered from this second operation without showing any trouble in speech, but, on account of the scar made on the cortex during operation, she was kept under control with barbiturates.

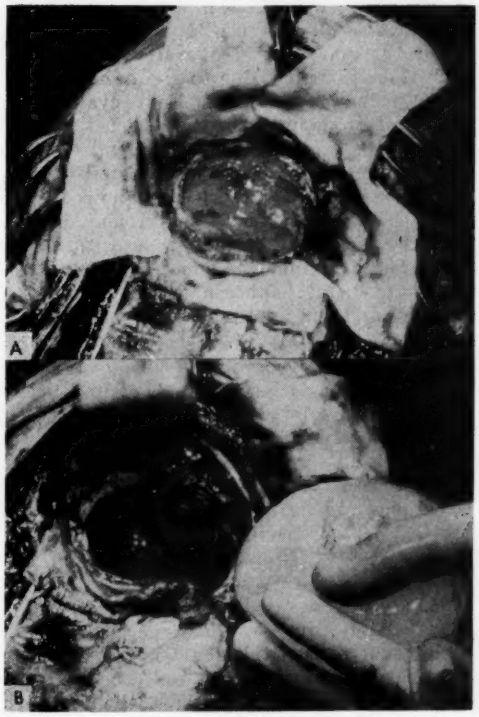



Fig. 6.—Fourth operation in Case 6, for removal of left parieto-occipital cyst.

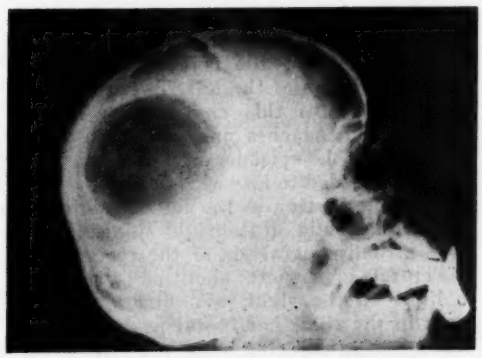


Fig. 7.—Cyst and its cavity.

In December 1958 she returned with the same symptoms. This time speech disorders accompanied her complaints. This was a type

of receptive aphasia, an obvious evidence of cortical destruction. Bilateral papilledema had returned. A third operation was done, with some difficulty due to the adhesions of the left temporal cortex. Four cysts were extracted without rupture. When the ventricles were explored, however, small vesicles poured out from these spaces. Twelve such vesicles were extracted. This showed that the ventricular system was inundated with the cysts and the outlook for the future was not very promising. The postoperative course was uneventful; aphasia regressed in one week, and the patient was discharged.

In January 1960 she returned in a distressing general condition, with convulsive seizures, aphasia and visual disturbances. Apraxia of the left hand was added to these symptoms. Severe painful tenderness was noted in the skull, behind the old surgical flap, i.e., in the parieto-occipital region. An electroencephalogram showed asymmetry of the left centroparietal region.

The patient accepted a fourth operation in spite of the risk. A second flap, behind the first one, was elevated, and a hydatid cyst as large as an orange was extirpated from the right parieto-occipital lobe. The patient bore the operation surprisingly well and was discharged from the hospital on the fifteenth postoperative day. At the time of writing, from a letter I have received, I understand that she is alive and well.

CASE 7.—U. A., a boy ten years old, was admitted to the Clinic in April 1960 with total blindness of the right eye and diminution of vision of the left. Two and a half months prior to this consultation he had had severe headaches and projectile vomiting. After this episode diplopia developed, which proceeded to loss of vision in the right eye and diminution in the left. Examination revealed anosmia on the right side; bilateral optic atrophy; paralysis of the rectus lateralis muscle on the left; abolition of the reflex to light on the right, and fine nystagmoid jerks in the right horizontal position. Slight deficiency of hearing was present on the right side. His body constitution suggested an adiposogenital syndrome.

Plain roentgenograms of the skull showed distortion of the right petrous pyramid and disseminated calcareous shadows around it. On the ventriculogram, displacement of the right temporal and occipital horns and anteroposterior shift of the right ventricle were observed. Casoni's reaction was positive.

Surgical exploration was performed through a right temporal flap, and a hydatid cyst, situated in the middle fossa between the petrous pyramid and the superficial sinus petrosus, was extracted. The cyst was extradural. The postoperative course was uneventful, and the patient was discharged two weeks after the operation.

CASE 8.—M. D., a man aged 25, sought medical aid for severe headaches and troubles of vision, in May 1957. During the preceding year he had noticed heaviness of the head and a retardation of his intellectual faculties. Five months after the onset of his disease, the headaches became continuous and localized at the vertex and frontal region. These headaches did not respond to analgesics and were accompanied by vomiting. At the same time blurred vision was added to these symptoms.

On neurologic examination the following symptoms could be detected: intellectual sluggishness, restriction of the visual fields, bilateral papilledema, paralysis of the rectus lateralis on the right and astereognosis in the right hand. The abdominal reflexes were diminished. Ventriculographic study was done, and during the perforation of the right burr-hole and the introduction of the brain cannula a clear liquid flowed out from the opening. Twenty cc. of air was injected into this cavity and an aerocystogram was obtained. The burr-hole was enlarged, and the cyst was extracted by aspiration and by releasing air into the contralateral ventricle. At the time of writing there has been no sign of recurrence, and for the moment we consider this patient cured.

## COMMENT

On reconsideration of the complaints of the patients whose cases are reported in this article, it can be stated that no definite or special symptoms for this disease can be recognized. The neurosurgeon, therefore, is confronted with the difficult problem of establishing a relation among the various complaints of a patient who displays signs of intracranial hypertension due to a space-occupying lesion of the brain and cerebral echinococciasis. Furthermore, he must be especially careful during operation, as dissemination of the

liquid contents of the cysts among the neurons is extremely dangerous. Adequate caution can be achieved only if the surgeon suspects the hydatid nature of the lesion before the operation. Unfortunately, the only reliable basis for the presumption of a hydatid cyst of the brain is its possibility; one must therefore bear this possibility in mind when confronted with a patient whose complaints are referable to regions where this parasite is not infrequent.

It is easy to see that all these symptoms can be correlated with advanced intracranial hypertension and, occasionally, a certain degree of focal irritation. This, as has been pointed out, can by no means be taken as characteristic of echinococciasis of the brain.

The rare association of motor disturbances and troubles due to sensitivity in the same patient (1 case only) shows that the brain tolerates very well the presence of hydatid cysts. For this reason, when a patient seeks medical aid on account of neurologic complaints, the cyst is usually very large.

Focal seizures, observed in one of my cases, were due to scarring and adhesions of the cerebral cortex after successive operations. The decerebrate state encountered in another case was probably caused by tentorial herniation. When the cases in this series are compared with those reported in the literature, the following conclusions can be drawn:

1. When a patient seeks medical treatment for complaints related to cerebral hydatid cysts, the lesion is already advanced, having taken the form of an expansive space-occupying tumor.

2. The patient, usually a child or a young adult, shows nonspecific signs of well-tolerated intracranial hypertension. In children, when this hypertension is compensated by disjunction of the cranial suture lines, focal signs can be more significant.

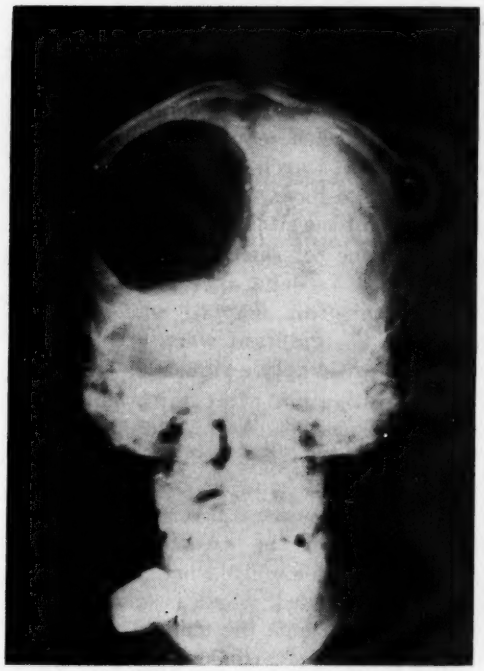


Fig. 8.—Aerocystogram taken in Case 8.

3. Peripheral cysts usually provoke local tenderness of the skull in the area under which they are located.

4. Hydatid cysts are most often situated in the supratentorial space, but it is difficult to conclude that these cysts have a predilection for any particular site within the skull. I have encountered such cysts in the ventricles, in the brain substance, at the cerebello-pontile angle and outside the dura mater.

5. When the hydatid cyst in the brain is not metastatic or due to recurrence, it is usually solitary.

I have found the following points valuable in making the presumptive diagnosis of cerebral echinococciasis prior to surgical exploration:

1. It is helpful to bear in mind the possibility of this disease in patients who

show symptoms of well-tolerated intracranial hypertension of long duration, in a region where this parasite is not rare.

2. Inquiry as to whether the patient has been in close contact with sheep or dogs, and a search for local tenderness in those who have, may give the surgeon some idea of the situation.

3. A zone of bioelectric disturbance surrounded by delta rhythm on the electroencephalogram may be detected. This symptom is significant when accompanied by other presumptive signs.

4. Investigation after injection of air into the ventricles can provide only signs indicating a space-occupying lesion, whereas if air is injected into the cyst itself and an aerocystogram is obtained, the result can be considered specific. This is possible only when the wall of the cyst is opened, which is most dangerous to the patient; the method, therefore, must be severely condemned and never utilized.

5. Cerebral angiographic study, on the other hand, is a most valuable diagnostic procedure. Roman and Iniquez-Sanjulian[16] have formulated valuable criteria for the interpretation of these images. These points can be summarized as follows: an avascular, spherical zone surrounded by stretched arteries with enormous displacement (spider legs). The only other lesions that provoke such images are hydrocephalus and certain supratentorial tumors in children. Relying on these criteria, these authors were able to reach a diagnosis preoperatively in 6 of their 10 cases.

6. Positive reactions to intradermal and complement fixation tests are valuable when they exist. On the other hand, their absence does not rule out the presence of echinococciasis.

*Treatment.*—Treatment must always be neurosurgical. Cysts situated near the cerebral cortex can be aborted without rupture by injecting air or saline solution into the contralateral ventricle. To apply methods used in the treatment of hepatic hydatid cysts, such as aspirating the cyst after injection of 1 per cent solution of formaldehyde into its cavity, or leaving a drain in the cyst, are extremely hazardous and should not be used, especially when the cyst is situated in the ventricle.

**Author's Note:** Sincere thanks are extended to Dr. Ergun Sabar and Cemalettin Topuzlu for their kind assistance.

ZUSAMMENFASSUNG

Es wird über acht Fälle von Hydatidenzyste des Gehirns berichtet. Nach Ansicht des Verfassers ist die Behandlung eine chirurgische. Die röntgenographischen und encephalographischen Befunde werden beschrieben und mit Illustrationen dargestellt. Da die Zysten gewöhnlich weit vorgeschritten sind, wenn der Patient ärztliche Hilfe sucht, ist eine sorgfältige und ins einzelne gehende Untersuchung von Wichtigkeit.

RÉSUMÉ

Huit cas de kystes hydatides du cerveau sont rapportés. L'auteur estime que ces cas relèvent de la neurochirurgie. Les preuves radiologiques et encéphalographiques sont décrites et illustrées. Du fait que les kystes sont en général avancés lorsque le malade consulte un médecin, l'auteur insiste sur l'importance d'examens minutieux et détaillés.

RIASSUNTO

Vengono riferiti otto casi di cisti idatidea del cervello. L'autore ritiene che il trattamento di questa affezione debba essere neurochirurgico. Descrive i quadri radiologici ed encefalografici e richiama l'attenzione sull'importanza di uno studio accurato e completo dacche' le cisti di solito giungono al medico in un grado avanzato di sviluppo.

RESUMEN

Se hace relación de ocho casos de quistes hi hidatidicos cerebrales. Para el autor el tratamiento debe ser neuroquirúrgico. Describe e ilustra la radiografía y la encefalografía. Se subraya la importancia del estudio minucioso de esta afección toda vez que comienza a dar sintomatología cuando la lesion está ya vanzada.

REFERENCES*

1. Cushing, H.: Tumeurs Intracraniennes. Paris: Masson et Cie, 1937.
2. Dandy, W. E.: In Lewis, Practice of Surgery, Chap. 1, Vol. 12, pp. 382-383.
3. Zulch, K. J.: In Handbuch der Neurochirurgie. Berlin: Springer Verlag, 1956, 3d ed., pp. 591-597.
4. Mattos Pimenta, A.: Handbuch der Neurochirurgie. Berlin: Springer Verlag, 1960, vol. 4, pp. 692-700.
5. Paillas, J. E., and Bonnel, J.: Encyclopedie Medico-chirurgicale. Neurology, 17500, A. 10.
6. Berkay, F.; Spinal Echinococcosis, J. Internat. Coll. Surgeons 22:34-43, 1954.
7. Dévé, F.: Ecchinococcose Secondaire. Paris: Masson et Cie, 1946.
8. Morquio, L.: Le kyste Hidatigue de cerveau chez l'enfant, Rev. sud. Amer. med. chir. 3:39-58, 1932.
9. Philipov, P.: Ecchinococcus cerebri with supplement to its surgical treatment, Annuaire de L'universite de Sofia Faculte de Medicine 25:153-193, 1945-1946.
10. Goinard, P., and Descuns, P.: Le kystes hydatigues de Neuraxe, Rev. Neurol. 86:369-415, 1952.
11. Roger, H.: Le kystes hydatigues du cerveau, Medicine Trop. 4:89-110, 1944.
12. Schroeder, A. H.: Diagnostico del guiste hidatico cerebral, Arch. int. Hidatid. 7:195-218, 1947.
13. Hoffmann, H. N.: Ecchinococcus Cysts of the Liver, Proc. Staff Meet. Mayo Clin. 35:51-57; 1960.
14. Obrador, A.; Urguiza, P., and Albert, P.: Quiste hidatico supurado del cerebroextirpado radicalmente, Rev. clin. esp. 29:180-183, 1948.
15. Fuster, B.; Castells, C., and Gastaut, H.: The Electroencephalographic Study of Hydatid Cyst of the Brain, Electroenceph. clin. Neurophysiol. 7:415-420, 1955.
16. Roman, A., and Iniquez-Sanjulian, J.: Hydatid Cysts of the Brain, J. Neurosurg. 12:321-335, 1955.

*Further information and references are available in *Handbuch der Neurochirurgie*, published by Springer in 1960.

The physician is basically a man of action. Perhaps this is why it is such a labor for him to practice reflection and contemplation once he has decided to substitute creation for action. This is not difficult to understand.

There are two basic types of man: the *occupied* and the *preoccupied*.

The *preoccupied* man is the intellectual, the artist, the creator who feels no need for action and shies clear of it for fear that it might stifle his creative impulse. The intellectual lives within himself, engulfed in his own inner wealth of thought. This is at once his glory and his misery. The intellectual needs nothing, he needs no one, he is a microcosm. The mind of an intellectual is a perpetual festival of thought, a treasure chest filled with wonders, a music box forever playing intimate sonatas which he alone can hear.

In contrast to this preoccupied intellectual man we have the *occupied* man, the man of action. The physician belongs to this group. *Preoccupation* precedes occupation. It is the act of thinking first *before* taking action; it interposes ideas between the desire and its execution. *Occupation* is actual action; it is the jump from desire to execution; it means living in a state of reflexes, on an instinctive conative plane instead of on the intellectual plane. The intellectual is a little apraxic; the man of action, on the other hand, vibrates with reflexes.

—*Marti-Ibañez*

# Ophthalmologic Surgery

## Refinements in Ophthalmic Surgery

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OCULAR surgery differs from most other types of surgery in that success or failure hinges to a large extent on attention to minute details. The objectives are limited, but there are many ways of performing the same procedures. The ophthalmic surgeon must be familiar with all of these methods, so that he can apply the one most suitable to a particular surgical situation. Aside from microophthalmic surgery, and partially because of it, the refinements of surgical instrumentation have been a major factor in obtaining more successful surgical results. New methods of anesthesia have also contributed along these lines.

*Instrumentation.*—In recent years the manufacturers of surgical instruments have presented a wide variety of instruments. Instead of being overwhelmed by the large numbers available, the surgeon should study all the instruments carefully and utilize those best suited to his personality, his "feel" and his grasp in holding a particular instrument.

I usually prepare a fornix-based flap during operation for cataract. In order to grasp the conjunctiva, I use the extra delicate Bishop-Harmon tissue forceps (Fig. 1). If one holds this forceps too tightly its teeth do not coapt, and the way to use this instrument effectively is by maintaining only a moderate degree of tension. All surgeons approach cataract with a certain amount of trepidation. I find that this forceps helps me to relax, so that I can approach the cataract extraction with the proper composure.

A needle holder (Fig. 2) should be selected with extreme care. Since a wide variety is available, it is advisable to experiment with all of them and to choose the particular holder that is most suitable for the surgeon's grasp, the shape of his hand, etc. Some ophthalmologists prefer curved jaws; others, straight jaws. I use needle holders with extra delicate straight jaws and, occasionally, the curved jaw needle holder for very fine needles. Fine needle holders are necessary for the new and extremely delicate needles now being introduced. In discussions with other ophthalmic surgeons, I have found no uniformity of opinion as to the

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*Refinements of instrumentation for ophthalmic surgical procedures are discussed. The author points out that each ophthalmologist should work out the problem according to his own needs and temperament and the factors contributing to the individual case, but offers suggestions based on his own experience, in the hope that they will be helpful to others. An outline he has found useful as a guide in augmenting local anesthesia is also presented.*

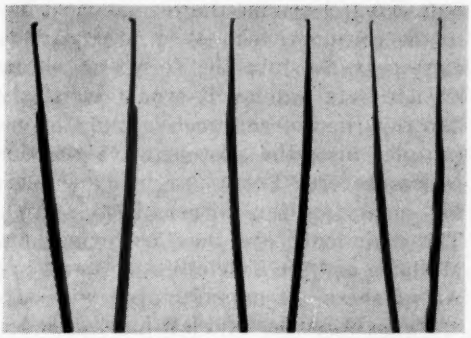

Fig. 1.—Tissue forceps. *Left to right,* Lester forceps useful for placing superior rectus suture; more delicate Lester forceps; extra delicate Bishop-Harmon tissue forceps for conjunctiva.

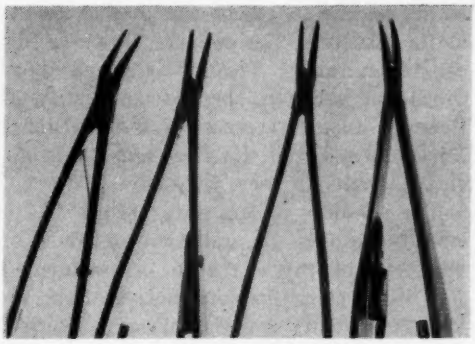

Fig. 2.—Needle holders. *Left to right,* Green needle holder; Castroviejo needle holder with lock; Castroviejo extra delicate needle holder without lock; Barraquer extra delicate needle holder with lock.

use of needle holders with or without a lock. I prefer a holder with a lock for placing three sutures before extraction of the lens. When my assistant hands me the instrument, with the needle firmly ensconced within its jaws, I do not have to grasp the handle tightly and consequently there is no tendency to develop any tremor. Just before inserting the needle, however, I unlock the holder. After removal of the lens I use a needle holder that is similar but has no lock, to facilitate insertion of the remaining four sutures without allowing the wound to gape. The tip of the needle is helpful in picking up the edge of the sclera.

Among the many types of suturing forceps (Fig. 3) the Castroviejo type is most popular. I prefer one with a wide handle. The teeth should be extra fine for cataract operations and should measure at least 0.5 mm. If the teeth are finer—0.3 mm.—they are also suitable for corneal transplantation. To obtain a good hold on the tissue, the side of the forceps with two teeth should be nearest the surgeon. Occasionally, if he wishes to minimize corneal trauma, the surgeon may reverse the forceps so that only one tooth is inserted into the cut end of the cornea.

Other suturing forceps with shorter handles are available. Among these, the

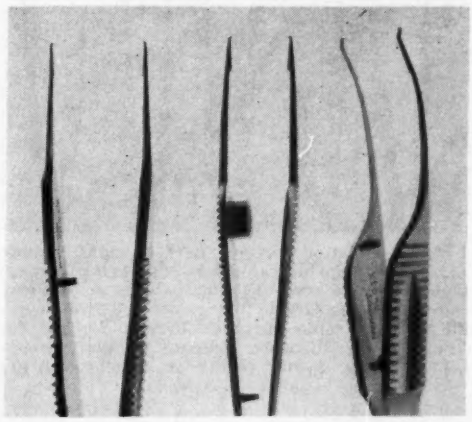

Fig. 3.—Suturing forceps. *Left to right,* Castroviejo wide handle forceps with extra fine 0.5 mm. teeth; Paufique forceps; Katzin-Barraquer forceps.

Paufique and the Sauer forceps also enjoy great popularity. On occasion one needs a curved suturing forceps, and the Katzin-Barraquer corneal utility forceps with a short handle, or the Girard modification with a longer handle, are assets.

The choice of fixation forceps (Fig. 4) depends on the purpose for which they are to be used. The Green fixation forceps is ideal for keratome incision or knife section when the ophthalmologist needs to fix below the cornea. On the other hand,

if he wishes to grasp the medial rectus at its insertion, the delicate Bracken forceps is suitable. To fix the sclera above the limbal incision, the Falcao, Rizzuti or Bracken fixation forceps can be utilized. Personally, I find the Bracken most delicate and satisfactory.

The choice of scissors (Fig. 5) is equally important and also depends on the type of procedure to be performed. For dissecting the conjunctival flap, the Westcott utility scissors are my choice. I find that if I confine the fornix-based flap to the conjunctiva it is not necessary to dissect as far into the fornix to obtain an adequate flap as it would be if the flap consisted of conjunctiva and Tenon's capsule; also, the postoperative reaction is less severe. There are many scissors for enlarging the corneoscleral section. The main ones are the Castroviejo, the McGuire and the Scheie-Westcott scissors. All of these are manufactured with separate right-handed and left-handed blades. I prefer the Castroviejo type. If the surgeon wishes to enlarge the corneoscleral section only a slight amount, the small curved Castroviejo corneal scissors are very practical. In the presence of an intumescent lens, a 180-degree limbal corneoscleral groove should be created before entering the anterior chamber, which is usually so shallow that an *ab externo* incision is necessary. The incision can then be enlarged with the tips of the Westcott scissors or the fine Castroviejo corneal scissors. Because the lens is anterior, extreme care must be taken to prevent its dislocation or the rupture of the capsule by the scissors.

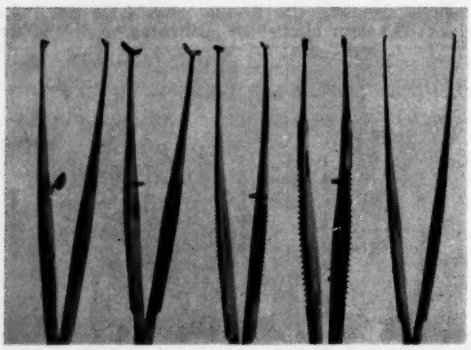

Fig. 4.—Fixation forceps. *Left to right,* Graefe forceps with spring catch for fixing below cornea; Green forceps with 12 mm. width of jaw for same purpose; Green forceps with 5 mm. width of jaw for same purpose; Rizzuti forceps for fixing sclera; Bracken delicate fixation forceps for grasping medial rectus or episcleral fibers above section.

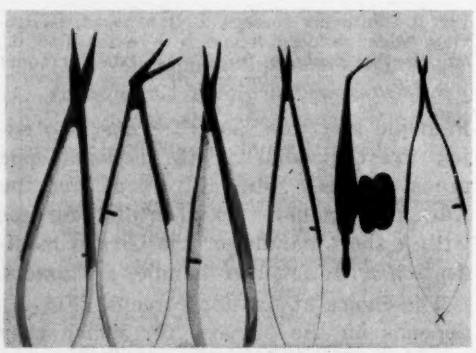

Fig. 5.—Scissors. *Left to right,* Westcott scissors; Castroviejo corneal section scissors; McGuire corneal section scissors; Castroviejo fine corneal scissors; Barraquer iris scissors; Vannas capsulotomy scissors.

Barraquer's extremely delicate modification of De Wecker's scissors has now become one of the most popular instruments for performing full iridectomy or peripheral iridectomy for either cataract or glaucoma.

The Vannas scissors is useful for performing a capsulotomy or a sphincterotomy, or for enlarging a peripheral iridectomy. It is one of the most delicate instruments in the ophthalmic surgical armamentarium.

Although this presentation deals primarily with the surgical treatment of cataract, I should like to introduce a tenotomy scissors I have recently devised (Fig. 6). It utilizes the principle of De Wecker's scissors on a spring handle. The blades are narrow and curved to conform

to the curvature of the sclera. With this instrument the surgeon can sever the tendon very close to its insertion without cutting the preplaced sutures, and thus the recession can be performed without any resection of extraocular muscle.

During the past several years, iris forceps (Fig. 7) have been improved considerably and made more delicate. For a cataract operation the simple jeweler's forceps with extra fine points, or Bonaccolto's modification thereof, can be most helpful in performing peripheral iridectomy. The Hess forceps, or the forceps modified by Gill or Botvin, can be used for full iridectomy.

Peripheral iridectomy for glaucoma requires a different approach. Here the surgeon prefers to perform the iridectomy through a relatively small corneoscleral opening. I usually grasp the iris with forceps and do not attempt to force it to prolapse. It is necessary to have two or three pairs of iris forceps available, because it is not always possible to grasp the iris adequately with the same forceps. Botvin has two modifications: one forceps has an anterior curve, and the shape of the other is a modification of that of the Hess forceps. These can be obtained with and without teeth. Gill's modification of the Hess forceps and the Suker forceps also have their advantages. The Chandler forceps is smooth and a little larger. Although I use forceps with fine teeth to perform an iridectomy, I employ a smooth forceps to grasp any tags that may remain. When performing an iridectomy, the surgeon should be certain that he has cut through both layers of the iris and that the iridectomy is large enough and basal enough to cure the glaucoma. The iridectomy should be visible through the cornea, and the pupillary border restored to its round shape, before the operation is completed. In this way the surgeon is assured that no iris is incarcerated in the scleral incision.

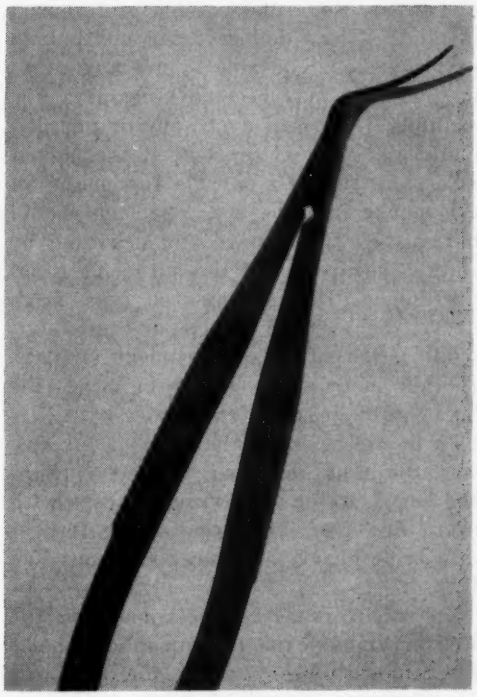

Fig. 6.—Author's tenotomy scissors.

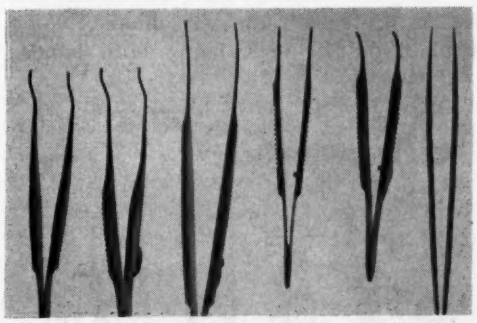

Fig. 7.—Iris forceps. *Left to right*, Hess forceps; Gill-Hess forceps (note position of teeth); Suker forceps; smooth forceps; Chandler smooth forceps; jeweler's forceps.

The choice of a capsule forceps (Fig. 8) is an important decision. It is advisable for the surgeon to examine all the different types available, so that he can select the one best suited to his technic

and grasp. Regardless of his preferential method of lens delivery, the ophthalmic surgeon should be able to use any other method that may become necessary. For example, if corneal dystrophy or narrow-angle glaucoma is present, it is inadvisable to introduce a capsule forceps or an erisophake into the eye. The lens should be grasped from above and delivered by sliding, regardless of the surgeon's usual preference. For sliding the lens from above, the Verhoeff forceps or the Rizzuti modification of this instrument is ideal. If this instrument cannot be used, the lens can be grasped from above with Kirby's modification of the Arruga forceps. For tumbling or other maneuvering of the lens I prefer the Arruga forceps with extra fine tips. The cross-action forceps is a trifle heavy, but many surgeons like it.

In recent years I have considered the Bell erisophake the instrument of choice for removal of the lens. In the Santilices modification, the cup is shaped so that it can be partially inserted under the iris. I prefer a round erisophake, which I place on the lens, using both hands; the right hand (palm up) grasps the bulb, and the left hand steadies the instrument at the hub of the cannula. The erisophake should be carefully placed on the lens under direct visualization, obtained by lifting the cornea with the central suture. It should be placed in such a manner that the cannula is almost parallel to the 180-degree meridian of the eye. In this way the lens can be tumbled or slid, depending on the way it seems to wish to leave the eye. It would be ideal if the surgeon could hold the erisophake in his right hand when operating on the right eye and in his left hand when operating on the left eye. The maneuvers required for tumbling with the erisophake are more complicated than those employed with the capsule forceps. Consequently, unless the surgeon is ambidextrous, he should always hold the erisophake with his dominant hand, even though he may prefer his left hand for the capsule forceps.

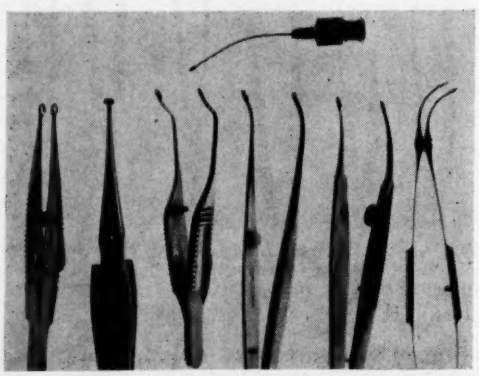

Fig. 8.—Capsule forceps. *Left to right,* Verhoeff capsule forceps for grasping lens above; McLean cross-action forceps (same purpose) for use with alphachymotrypsin; Arruga forceps, Gill handle; Arruga forceps, small cup; Arruga forceps, extra small cups; Bonaccolto capsule fragment forceps; Troutman 25-gauge cannula for introducing alphachymotrypsin.

I have found Troutman's 25-gauge cannula an ideal vehicle for introducing alphachymotrypsin. Incidentally, Troutman has modified several instruments, making them more delicate for operating under microscopic visualization.

*Anesthesia.**—General anesthesia as utilized by general surgeons has drawbacks for ophthalmologists, and these are well known to all. Nevertheless, it would be ideal to have the patient asleep during the procedure. At the New York Eye and Ear Infirmary, what is called "combined anesthesia" is used. The anesthesiologist keeps the patient unconscious, but it is mandatory for the surgeon to apply the same topical and regional anesthesia he would use if the patient were awake.

The patient is premedicated with Nembutal or Seconal, 1.5 gr. taken orally an

*I am indebted to Dr. Martin W. Livingston of the Anesthesia Department of the New York Eye and Ear Infirmary for the material on anesthesia.

hour and a half before the operation, and with Demerol, 50 to 75 mg., and atropine, 1/150 gr., given intramuscularly, one hour before the operation. An intravenous drip of 0.4 per cent Surital is begun in the operating room. While the patient is still cooperative, his tongue and oropharynx are sprayed with 10 per cent cocaine. Sleep is induced, and the Surital drip is continued until the jaw is relaxed and the pupils constricted. An oropharyngeal airway with an insufflating nipple is gently inserted behind the tongue, and a mixture of 3 liters of nitrous oxide and 1.3 liters of oxygen is insufflated into the back of the throat. The anesthetist maintains the airway. After local regional anesthesia has been induced, the operation is performed. Postoperatively, after the eye has been dressed, nitrous oxide and oxygen are discontinued and the needle removed. Recovery is rapid, and the patient usually responds to commands on the table.

A method of quieting an unruly patient scheduled for cataract extraction with local anesthesia is "fractional sedation," which can be given by the surgeon with or without the aid of an anesthesiologist. The patient has been premedicated, of course, for the cataract extraction under local regional anesthesia. A drip of 5 per cent dextrose and distilled water is inserted into the vein. One hundred mg. Demerol is prepared in 10 cc. of distilled water. (Nembutal can also be used.) It is injected into the tubing, 10 mg. at a time, until the patient has reached optimum relaxation. Oxygen can be administered, especially if the patient is uncooperative because of hypoxia.

SUMMARY

In this article the author has limited his comments to refinements in instrumentation. A few suggestions that he has found helpful are included. Each ophthalmic surgeon must work out his own instrumentation according to his individual needs and temperament and the manner in which he prefers to hold his instruments. Success in ocular surgery depends to a great extent upon attention to detail. Consequently, each instrument must be chosen according to the type of service it is to accomplish. The variety of instruments available at the operating table should cover any situation that may arise. An outline for use in augmenting local anesthesia is presented, including two methods developed by the Department of Anesthesia at the New York Eye and Ear Infirmary. These are "combined anesthesia" and "fractional sedation."

RÉSUMÉ

Dans cet article, l'auteur limite ses commentaires aux perfectionnements de l'instrumentation; il y joint quelques suggestions qui lui ont paru utiles. Chaque chirurgien ophtalmologiste doit se créer une instrumentation adaptée à ses besoins individuels, à son tempérament et à sa façon propre de travailler. Le succès de la chirurgie oculaire dépend en grande partie de l'attention accordée à chaque détail. Il s'ensuit que chaque instrument doit être choisi en relation avec le genre de travail à exécuter. La variété des instruments à disposition à la table d'opération devrait répondre aux diverses situations avec lesquelles l'opérateur peut être confronté. L'auteur présente également un aperçu ayant trait à l'augmentation de l'anesthésie locale, y compris deux méthodes créées par le service d'anesthésie de la "Eye and Ear Infirmary" de New York, soit l' "anesthésie combinée" et "les calmants fractionnés."

RESUMEN

En este articulo el autor limita sus comentarios a detalles del instrumental quirurgico, señalando algunas sugeren-

cias que a él le han resultado útiles. Cada oculista debe escoger su instrumental de acuerdo con sus preferencias individuales, su forma de coger los instrumentos, y su temperamento. El éxito depende en gran parte de pequeños detalles, y por eso cada instrumento tiene su función particular, y en la mesa de instrumental deben de estar todos los que hagan falta para cubrir posibles situaciones inesperadas.

También presenta el autor un esquema sobre las aplicaciones de la anestesia local, que van en aumento; señala dos métodos, denominados "anestesia combinada" y "sedación fraccionada," puestos en práctica por el departamento de Anestesia del "New York Eye and Ear Infirmary."

RIASSUNTO

In questo articolo ci si limita ad alcuni dettagli sugli strumenti, fornendo alcuni consigli utili. Ogni chirurgo oftalmico deve regolare il proprio strumentario a seconda delle sue necessita, del suo temperamento e del modo in cui preferisce maneggiare ogni strumento. I successi, in chirurgia of oftalmica, dipendono in gran parte da piccoli dettagli e pertanto ogni strumento deve essere scelto a seconda del servizio che ad esso viene chiesto. Sul tavolo operatorio deve essere possibile trovare lo strumento adatto per qualunque situazione si presenti. Vengono, inoltre, descritti due metodi di anestesia in uso presso il Reparto Anestesiologico della Eye and Ear Infirmary di New York, definiti come "anestesia combinata" e "sedazione frazionata."

ZUSAMMENFASSUNG

Der Verfasser beschränkt seine Ausführungen in der vorliegenden Arbeit auf Verfeinerungen der Instrumente und macht einige Vorschläge, die sich ihm als hilfreich erwiesen haben. Jeder Augenchirurg muss sich je nach eigenen Bedürfnissen, Temperament und nach der Art, wie er seine Instrumente zu halten beliebt, sein eigenes Instrumentarium zusammenstellen. In der Augenchirurgie hängt der Erfolg zum grossen Teil von der Aufmerksamkeit ab, die Details gewidmet wird. Folglich muss jedes Instrument sorgfältig nach den Funktionen, die man von ihm erwartet, ausgewählt werden. Die auf dem Operationstisch bereitliegenden Instrumente müssen genügend vielfältig sein, um jede etwa auftretende Notsituation zu decken. Es liegt ferner ein Überblick über die Anwendung von Verfahren zur Verstärkung der örtlichen Betäubung vor. Dazu gehören zwei von der Anästhesieabteilung der New Yorker Augen- und Ohrenklinik entwickelte Methoden, nämlich die "kombinierte Anästhesie" und die "fraktionelle sedative Anästhesie."

As a young man in Padua, Harvey's personality must have been an odd contrast of raw spots and dignity, of bad temper and intellectual flights, with friendliness for the few and aloofness toward many. But if he was unequal to others physically, he was superior mentally and he soon stood out from the other students at Padua. He was elected to one of the student councils and he made a friend on the faculty. This new friend was Dr. Fabricius, who held the same position in the university that once had been filled by Vesalius . . . Fabricius had discovered the valves in the veins and showed them to Harvey, which may well have been the beginning of Harvey's interest in the functioning of the circulation.

—*Young*

# Orthopedic Surgery

## Rehabilitation in Ceylon

J. FRANCIS SILVA, F.R.C.S., F.A.C.S., F.I.C.S.

COLOMBO, CEYLON

*The agencies of rehabilitation in Ceylon, beginning with schools and workshops for the deaf and the blind, are developing toward a more thoroughgoing coverage of necessary aid to the disabled, especially to persons with orthopedic injuries or abnormalities and those in need of occupational therapy. For want of space, equipment and facilities, the progress of rehabilitation has necessarily been slow. Although a rehabilitation center for patients discharged from tuberculosis sanatoriums has been established, there is still no orthopedic hospital in Ceylon. Attempts to interest the general public and the officials of government in this problem are being made with increasing perseverance, and it is hoped that major improvements will soon be made.*

THE era of service to the disabled in Ceylon commenced in 1912, with organization of the Ceylon School for the Deaf and Blind by the late Miss Mary Chapman, a missionary of the Church of England.

The school had very humble beginnings but has gradually spread its field of work over a considerable range. It provides general education as well as extracurricular activities. After a period of general education the blind are given training in textile weaving, rattan work, chair caning, knitting, coir work, shorthand and typewriting, telephone operating, and massage. The deaf are trained as seamstresses, tailors, carpenters, weavers and gardeners. More recently photography, poultry keeping, decoration and compositing have been added to the curriculum.

In addition to the major school, which has an average of 200 to 250 inmates, there are also St. Joseph's school for the Deaf and Blind at Ragama, which is smaller and cares for about 120 persons; the Nuffield School for the Deaf and Blind, Kaithady, which cares for about 66 persons, and the School for the Blind and Orphanage, Mahawewa, is responsible for about 11 persons.

These schools are run chiefly on a voluntary basis, with a per capita grant from the Government as well as building grants.

In the employable group (Tables 1 and 2) there are 1,931 blind and 1,731 deaf persons.

It is planned to establish more schools in the near future, and an employment officer has just been appointed to deal with the trained personnel.

Interest in the disabled and the desire to organize any services for the orthopedically handicapped have had but a very short history in Ceylon. In its early

Read at the Eighth World Congress of the International Society for the Welfare of Cripples.
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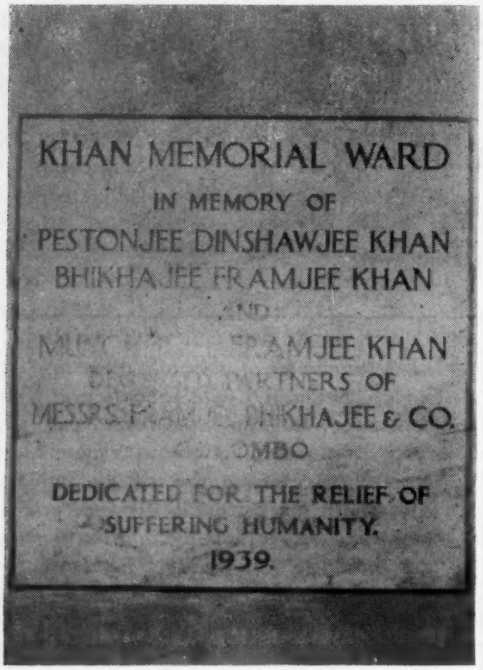


Fig. 1.—Foundation stone of Khan Memorial Ward.

days this work was confined to the care of the disabled child. It is only in recent times that a wider view of the field has begun to be appreciated, both by the administration and by the general public.

The laying of the foundation stone, in 1939, of the Khan Memorial Ward (Fig. 1), saw the birth of an era of interest in less fortunate compatriots.

The philanthropy of the late Mr. Pestonjee Dinshawjee Khan Bhikhajee Framjee Khan and Mr. Muncherjee Franjee Khan was indeed a boon to the unfortunate children who were to benefit in the first instance. Had it not been for them this field of work might not have been opened for several years.

The ground floor of the building was the Outpatients Section, where the attendance was confined mostly to children with congenital deformities. Whenever possible these children were treated as outpatients, while those needing hospitalization were accommodated on the first floor. From these small beginnings the volume of work gradually increased, and it became possible to break down the prejudices that existed against operations, anesthesia and the use of plaster, as a result of which the demands made on this service gradually increased.

By 1947 the work of this department had greatly increased, giving the impression that the time was ripe for expansion of the service to include adult disabled. Thus, in 1947, the small clinic was shifted to the present building, and the adult disabled were for the first time treated systematically. Prior to this time, orthopedically handicapped adults were treated in general surgical wards.

Fig. 2.—Scene in workshop (see text).

In addition to the development of the clinic, it was considered desirable to open a workshop for turning out surgical appliances, and thus was planned the development of the Orthopedic Workshop (Fig. 2.). Simultaneously with this step, a prosthetic service for the manufacture of artificial limbs was embarked upon (Fig. 3).

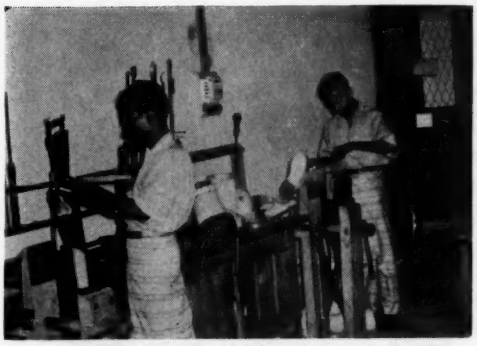

Fig. 3.—Workers in prosthetic service for manufacture of artificial limbs.

From 1947 to 1957 (Table 3) the steady increase in attendance indicates the popularity gained during this period.

So far most of the work in this field was confined to the realm of cold orthopedics. Adults and children were treated for their disabilities and fitted with surgical appliances, while the limbless were fitted with artificial limbs. Table 4 shows the number of surgical appliances and artificial hands and legs issued from 1947 to 1957.

It will be noted that the field was very limited, and no rehabilitative program as such was started.

TABLE 1.—*Numbers in Training (Deaf and Blind)*

| | *Deaf* | *Blind* |
|---|---|---|
| (a) Workshops for the Deaf and Blind, Seeduwa (training in weaving, carpentry, coir work, knitting, sewing, rattan work, plastics, etc.) | 15 | 49 |
| (b) Training Centre for Blind Women, Bullers Road, Colombo (training in mat weaving, knitting and weaving) | — | 6 |
| Total | 15 | 55 |

TABLE 2.—*Number of Workers in Sheltered Conditions (Blind)*

| | |
|---|---|
| Workshops for the Deaf and Blind, Seeduwa | |
| Weaving | 12 |
| Coir work | 11 |
| Knitting | 13 |
| Rattan | 9 |
| Plastics | 1 |
| Braille printing | 1 |
| Total | 47 |
| Home Workers | |
| Blind | 68 |
| Deaf | 28 |
| Total | 96 |

TABLE 3

| | *1947* | *1948* | *1949* | *1950* | *1951* | *1952* | *1953* | *1954* | *1955* | *1956* | *1957* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Outpatients | — | 8,618 | 17,476 | 20,900 | 21,943 | 24,886 | 39,914 | 31,900 | 42,473 | 55,575 | 59,318 |
| Physiotherapy | — | — | — | — | — | — | 8,807 | 11,513 | — | — | 37,567 |
| Occupational therapy | — | — | — | — | — | 112 | — | 398 | 1,572 | 753 | 4,312 |

TABLE 4

| | *1947* | *1948* | *1949* | *1950* | *1951* | *1952* | *1953* | *1954* | *1955* | *1956* | *1957* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Artificial arms | — | 25 | 28 | 50 | 11 | 15 | 30 | 28 | 15 | 31 | 27 |
| Artificial legs | — | | | | 56 | 44 | 55 | 57 | 50 | 71 | 93 |
| Surgical appliances | — | — | — | 1,177 | 1,429 | 2,922 | 2,387 | 2,512 | 3,326 | 3,642 | 3,770 |

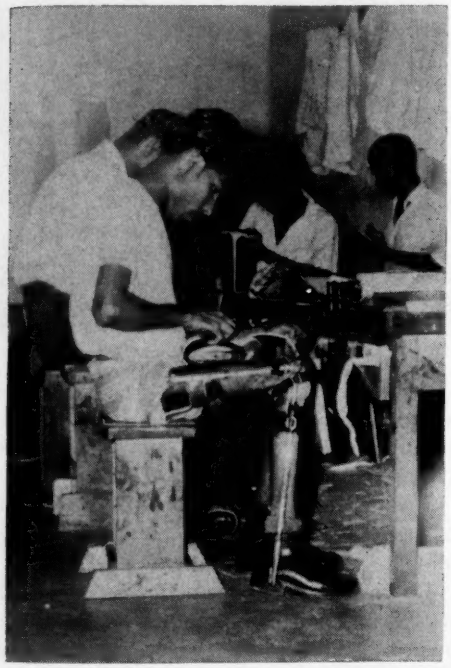

Fig. 4.—Trainees busy in workshop.

In 1951 the Occupational Therapy Section of the Department was opened, with the aid of a Colombo Plan occupational therapist from Australia. Since then it has been a fully functioning section, and this, together with our Department of Physiotherapy, has been the first step toward a real rehabilitation for the disabled in Ceylon.

In 1952, in conjunction with the Department of Social Services, industrial rehabilitation was begun in a small way. Under this scheme a joint committee of the two departments selected suitable candidates for a training in any of the following trades: carpentry, metal work, leather work, spray painting and electroplating. Principally for want of accommodation, those in training at any one time were limited to 15.

Figure 4 shows some of these trainees in the Workshop.

Table 5 shows the number of persons rehabilitated each year since starting this work.

There has been no organized traumatic service to care for persons disabled by road or industrial accidents. The lack of such an organized traumatic service is indeed a great loss and has no doubt contributed to increased physical disability in Ceylon, but it is hoped that in the next few months a fully organized accident service will be established in the city of Colombo to care for such persons, thus reducing disability to a minimum whenever possible and making rehabilitation in the traumatic group a great deal easier.

From the chronic orthopedic point of view, the need of an organized orthopedic

TABLE 5

| | *1952* | *1953* | *1954* | *1955* | *1956* | *1957* | *1958* | *1959* |
|---|---|---|---|---|---|---|---|---|
| Number of trainees rehabilitated | 8 | 8 | 8 | 8 | 8 | 9 | 15 | 15 |

hospital is deeply felt. At present there are 141 beds for patients with chronic orthopedic diseases. This is barely enough to meet the demands made on it and its extension should be the next step in the program of development—a convalescent extension to the wards a few miles out of the city of Colombo, to form the nucleus of an orthopedic hospital.

The development and expansion of rehabilitation of the disabled has been very slow indeed. For want of space we have confined rehabilitation to the bare few already mentioned. It is hoped that, on the premises of our orthopedic hospital, a rehabilitation center can be established to meet the needs of about 100 to 150 orthopedically disabled persons.

I have dealt with rehabilitation entirely from an orthopedic point of view. Patients with tuberculosis discharged as cured from sanatoriums throughout the island have a modern rehabilitation center where many trades are taught, including carpentry, weaving, market gardening and tailoring. There is resident accommodation for 100 trainees.

It is thus evident that most of the services are in their infancy, particularly service to the orthopedically disabled.

The field of work is vast. Interest must be aroused in the general public so that each person can contribute in his or her small way to the development of services for their less fortunate fellow human beings.

Government sponsorship must also be stimulated, so that with the cooperation of both private and Government enterprise it will be possible, in the near future, to take better care of the disabled in Ceylon.

**Author's Note:** I am indebted to Aristotelis A. Christou, M.D., resident in obstetrics and gynecology, Brooklyn Women's Hospital, for his help in the preparation of this article.

ZUSAMMENFASSUNG

Die Agenturen, die sich in Ceylon mit der Rehabilitierung von Kranken beschäftigen, beginnend mit Schulen und Werkstätten für Taube und Blinde, machen Fortschritte in der Beschaffung notwendiger Hilfe für Verkrüppelte, besonders für Kranke mit orthopädischen Verletzungen oder Anomalien, und für Kranke, die Beschäftigungstherapie brauchen. Wegen Mangels an Platz, Ausrüstungen und Gelegenheiten erfolgen die Fortschritte notwendigerweise langsam. Ein Wiederherstellungszentrum für aus Tuberkulosesanatorien entlassene Kranke ist eingerichtet worden, ein orthopädisches Krankenhaus gibt es jedoch in Ceylon noch nicht. Es werden mit wachsender Beharrlichkeit Versuche unternommen, das allgemeine Publikum und die Regierungsstellen für dieses Problem zu interessieren, und man hofft, dass sich die Verhältnisse bald bessern werden.

RÉSUMÉ

Les centres de réhabilitation de Ceylan —a commencer par les écoles et ateliers de travail pour sourds et aveugles—sont en voie de développement et tendent à élargir l'aide nécessaire aux infirmes, spécialement aux malades attaints de lésions ou d'anomalies orthopédiques et à ceux ayant besoin d'une réadaptation professionnelle. Les progrès dans le domaine de la réhabilitation ont nécessairement été lents par suite de manque de place, d'quipement et de crédits. Bien qu'un centre de réhabilitation pour malades sortant de sanatoriums pour tuberculeux ait été créé, Ceylan ne possède pas encore de clinique orthopédique. Des efforts importants sont tentés en vue d'intéresser à ce problème les autorités et le grand public, et l'on espére arriver

bientôt à de grandes améliorations dans ce domaine.

RIASSUNTO

Gli istituti di rieducazione in Ceylon, a cominciare dalle scuole e dai laboratori per muti e ciechi, stanno progressivamente sviluppandosi allo scopo di coprire le necessita' del paese, specialmente nei confronti dei soggetti con lesioni ortopediche o malformazioni o per quelli che hanno necessita' di terapia occupazionale. Naturalmente questo processo di miglioramento e' lento per le difficolta' di spazio, di attrezzatura e di mezzi. Benche' sua stato organizzato un centro di riabilitazione per i malati dimessi dal sanatorio antitubercolare, in Ceylon ancora non esiste un ospedale ortopedico. Si compiono, tuttavia, continui sforzi per interessare a questo problema l'opinione pubblica e il governo e si spera che presto esso potra' essere risolto.

RESUMEN

En Ceilán las agencias de rehabilitación, comenzando con escuelas y talleres para sordos y ciegos, se van desarrollando hacia una mayor extensión para dar la necesaria ayuda a los inválidos, especialmente personas con lesiones ortopédicas y anormalidades. Por falta de espacio, equipos y otras facilidades es progreso de la rehabilitación ha sido forzosamente lento. Aunque ha sido establecido un centro de rehabilitación oara sujetos procedentesde los snatorios antituberculosos, no hay aún ningún hospital ortopédico Ceilán. Se llevan a cabo en la actualidad muchos intentos para hacer colaborar en esta obra al estado y a la iniciativa particular.

Leonardo dissected more than thirty corpses and planned to write a one-hundred-twenty-volume treatise on anatomy. His drawings supersede Galen and restore the anatomic dignity of man. He studied the fetal membranes and denied that the fetus can cry in the uterus. He described bone textures and muscular functions and placed bones in wire boxes to study their dynamics. Fascinated by mechanical laws, he studied muscular antagonisms and correctly ascertained the points of insertion and outlet of a muscle. He injected the cerebral ventricles with liquid wax and also described the pleura and lungs, but did not emphasize the circulation of the blood, since to have done so would have been heresy. With such work, he created the experimental method.

—*Marti-Ibañez*

# Positional Nystagmus and Vertigo

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*A method of examination for positional nystagmus and vertigo is presented in detail, with a classification of the combined conditions into two types, central and peripheral. Some of the etiologic factors are mentioned, e.g., injury to the head, mastoid infection, vestibular lesions and lesions of the neck. Current therapeutic measures are listed and the general prognosis reviewed.*

THE term "positional nystagmus and vertigo" denotes nystagmus and vertigo that appear only when certain positions of the head and body are assumed. In contrast, ordinary spontaneous nystagmus will occur whatever the position of the head. To simplify diagnosis, one examines for positional nystagmus with the patient's head in the second-degree position, i.e., with the eyes looking straight ahead.

Nystagmus and vertigo due to changes in position are considered worthy of attention because the combination is so frequently overlooked. Yet in a series of 334 patients it was present in at least 30.

At the beginning of the series I did not routinely look for this sign, and I am sure that I missed it in many patients. Since the examination is exceedingly short and simple and can be done in any office, I wish to stress the fact that positional nystagmus and vertigo should be sought in every patient with vertigo.

*Method of Examination.*—The patient is told that he will be placed in various positions and that it is imperative to keep the eyes open at all times. I use frenzel glasses to magnify the eyes. It is quite feasible, however, to perform this test without any magnification. The patient sits in an upright position on a couch or a table and is instructed to gaze directly forward. Spontaneous nystagmus is sought. Then the patient's head is held by the examiner and the patient is placed in a supine position, with his head hanging over the edge of the table. He is laid down quickly, within a few seconds. A search is made for positional nystagmus, and the patient is questioned as to vertigo. There is usually a period of latency lasting two to ten seconds, although its duration is not important. If nystagmus does not occur within thirty to fifty seconds, the patient is raised to the upright sitting position and again the examiner looks for nystagmus. Then the patient is placed in a supine position with

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his head hanging over the edge of the table and directed to the left. If nystagmus is not observed within thirty to fifty seconds, he is returned to the sitting position. After a few seconds he is placed in a supine position with the head hanging and the face directed to the right. If nystagmus is noted while the patient is in any position, that position is held until the nystagmus subsides. If the nystagmus persists for more than thirty seconds, it will probably continue as long as the critical position is maintained.

In the vast majority of cases vertigo accompanies the nystagmus. If nystagmus occurs in one position, the patient is returned to the upright position, rested until the nystagmus disappears and replaced in the same position that provoked nystagmus. If nystagmus does not reappear, it is recorded as "readily fatigable." If it reappears with diminished intensity and then, on further attempts, does not recur at all, it is recorded as "gradually fatigable." If it continues with undiminished repetition it is recorded as "nonfatigable." These three positions seem the most informative. Other positions, such as those assumed in looking up or stooping, are difficult for the examiner and do not add too much information.

When the test gives a positive result, an additional refinement is to eliminate the effect of rapid movements of the head or neck by avoiding any relative motion of the head and body and moving the head slowly into the critical position. An additional refinement is to record the results electronystagmographically.

*Classification.* — Positional nystagmus and vertigo may be roughly divided into two types, peripheral and central. In cases of the central type, the nystagmus appears, without any latency period, as soon as the head is placed in the critical position, and continues to beat at a steady rate as long as the head is held in that position. It will also begin to beat each time the position is resumed. Frequently nystagmus may occur with more than one position of the head, and its direction may change with the direction of the face. This type, in which the nystagmus is steady and nonfatigable, is observed in all patients with a proved lesion of the central vestibular connections. Occasionally, with the central type, the associated vertigo is slight or absent. This type constitutes only about 10 per cent of the total.

In the other type, which is more frequent, ranging from two to ten seconds before the onset of nystagmus, the ocular movements may be tumultuous, often with a wide excursion, and usually there is a combination of rotatory and horizontal movements. The ocular movements disappear within five to thirty seconds. Nystagmus and vertigo appear only with the head in one or two positions and are fatigable. My impression is that in the majority of these cases the origin is peripheral. Such cases constitute almost 90 per cent of the total incidence.

The great majority of patients with the peripheral type have no other signs of vestibular disturbance; that is, caloric tests of the function of the semicircular canal, audiologic study and neurologic examination all give negative results. There is no associated spontaneous nystagmus. This emphasizes the importance of doing this test routinely. It must be emphasized that, in order to elicit positional nystagmus, it must be necessary to repeat the test several times. It is commonly noted that nystagmus does not develop every time the patient assumes a central position, as it does in the presence of the central type. Tests on several different days may be required. This is probably the reason that the patient does not voluntarily inform one that the vertigo occurs when he lies down in bed,

for instance, on the right side. It does not always occur when he lies down on the right side or, if it occurs, it disappears quickly. Quite commonly, when the patient is brought from the supine to the sitting position, he complains of dizziness, but there is no associated nystagmus.

*Etiologic Factors.*—In many cases, injury to the head is associated with positional vertigo and nystagmus. Such an injury often has legal entanglements, and the patient may be suspected of malingering. Positional nystagmus and vertigo may be the only signs of organic pathologic change. It is commonly assumed that positional nystagmus and vertigo cannot arise from psychogenic causes; therefore, discovery of these conditions in a case of head injury would denote organic disease.

2. Chronic mastoid infection and otitis media can cause positional nystagmus and vertigo. In my own experience, this is the most common type of vertigo observed in such cases. Positive results from positional tests are much more common than positive results from fistula tests. Recently, Bennett[1] reported the inadvertent removal of a stapes footplate at mastoidectomy. He covered the oval window with skin. Positional vertigo lasted for three months in this case, occurring when the patient was supine, with the affected ear downward.

3. I had 3 patients with positional nystagmus and vertigo occurring after stapedectomy. In 2 of these a large piece of footplate was lost in the vestibule; in the third the strut placed was too long. In these cases positional nystagmus and vertigo lasted from six to nine months, elicited with the patient in the supine position and with the affected ear downward. Incidentally, the 3 patients achieved excellent hearing. The positional vertigo completely disappeared.

4. Lesions in the neck are an important cause. Occipital headaches, limited motion of the neck, tenderness in the back of the neck and roentgen changes in the cervical vertebrae (particularly the fifth to the seventh) may be present also. Lesions of the neck are important causes, and the neck should be carefully investigated. In 1 of my cases a cervical collar cleared the positional nystagmus and vertigo immediately. In another case, removal of a herniated cervical disc effected the disappearance of severe positional nystagmus and vertigo.

5. A heterogeneous group of causes has been reported, observed either at autopsy or in the laboratory: atheromatous occlusion of a utricular artery, damage to the utricular macula, pressure in the upper part of the vestibule, pressure of tortuous vessels on Scarpa's ganglion,[2] cutting of the utricular nerve and the use of alcohol, barbiturates and tranquilizers. Lindsay[2] postulated that postural nystagmus and vertigo result from sudden partial loss of function. This seems an important observation and coincides with my observations. In many cases a specific cause cannot be determined.

As to the central causes, Fernandez[3] was able to produce postural nystagmus of a fixed type in cats by destruction of the cerebellar nodule. Labyrinthectomy removed the postural nystagmus; cocaine in the middle ear temporarily prevented the postural vertigo. Six hours after the effect of the cocaine wore away, the positional nystagmus and vertigo reappeared. Lindsay[4] reported the central type as associated with cerebellar tumor, multiple sclerosis, tumor of the cerebellopontine angle, concussion, hypertension, arteriosclerosis and hypotension. Zlotnikoff[6] has produced central nystagmus by placing a lead shot on the floor of the fourth ventricle. Injuries to the head, in my experience, usually cause the direction-fixed peripheral type of nystagmus and vertigo, not the central type.

Treatment is grossly unsatisfactory, because nothing of consistent value is known. Among the methods that have been tried are the administration of antivertiginous drugs, such as dramamine, nicotinic acid and histamine (by injection), and the use of sedatives. Balancing exercises have also been tried, and the injection of procaine hydrochloride into trigger areas in the sternocleidomastoid muscles has been reported as helpful.[7] As has been mentioned, any lesion of the neck should be vigorously treated.

Labyrinthectomy has been successfully used to eliminate positional vertigo. I have used ultrasound labyrinthectomy for positional vertigo associated with chronic mastoiditis. This has given encouraging results and does preserve the hearing.

*Prognosis.*—In the average case the condition usually clears without treatment in one to nine months. Harrison has reported that in his cases the average period of recovery after injury to the head was two and a half months. I have observed 1 case of positional nystagmus and vertigo, presumably due to a lesion of the neck, in which both conditions persisted for eight years. In another case, in which positional nystagmus and vertigo were associated with chronic mastoid infection, both persisted for more than twenty years.


RÉSUMÉ

L'auteur décrit de façon détaillée une méthode d'examen du nystagmus et du vertige de position. Il définit la classification en catégories du type central et du type périphérique. Quelques aspects étiologiques sont revus, ceux, par exemple, ayant trait aux lésions de la tête, aux affections mastoïdes, aux traumatismes vestibulaires et aux lésions du cou. Les méthodes courantes de traitement essayées par les auteurs sont mentionnées, et le pronostic général est passé en revue.

RESUMEN

Se explica detalladamente un método para explorar el nistagmo posicional y el vértigo, clasificándolos en de origen central y de origen periférico. Se repasan las posibles causas etiológicas, y entre ellas, los traumatismos de cráneo y vestibulares, las infecciones de la mastoides y las lesiones del cuello. El autor señala cuáles son los métodos más corrientes que él emplea en el tratamiento, y cuál es el pronóstico en general.

RIASSUNTO

Viene presentato in dettaglio un metodo per l'esame del nistagmo e della vertigine, in cui si distinguono forme centrali e periferiche. Fra i fattori etiologici vengono ricordati i traumi del capo, le infezioni mastoidee, i traumi del vestibolo e le lesioni del collo. Vengono ricordati i piu' comuni metodi di cura impiegati dall'autore e i risultati relativi.

ZUSAMMENFASSUNG

Es liegt eine ausführliche Darstellung einer Untersuchungsmethode des Stellungsnystagmus und des Stellungsschwindels vor. Die Unterteilung in zentrale und periphere Formen der Erkrankungen wird erklärt. Auf einige ätiologische Betrachtungen wie z.B. den Zusammenhang mit Kopfverletzungen, Warzenfortsatzinfektionen, Verletzung des Vestibüls und Erkrankungen des Halses wird eingegangen. Der Verfasser erwähnt die von ihm angewandten gegenwärtigen Behandlungsmethoden und gibt einen Überblick über die allgemeine Prognostik.


REFERENCES


1. Bennett, R. G.: An Instructive Case of Positional Nystagmus of the Peripheral Type, J. Laryngol. & Otol. 24:586, 1960.
2. Lindsay, J. R., and Hemenway, W. G.: Postural Vertigo Due to Unilateral Sudden Partial

Loss of Vestibular Function, Ann. Otol., Rhinol. & Laryngol. 65:692-706, 1956.

3. Fernandez, C.; Lindsay, J. R., and Alzate, R.: Postural Nystagmus Due to Localized Cerebellar Lesions in the Cat, A. Otolaryngol. 50:287-290, 1959.

4. Lindsay, J. R.: Postural Vertigo and Positional Nystagmus, Ann. Otol., Rhinol. & Laryngol. 60:1134, 1951.

5. Zlotnikoff, E. A.: Contribution to the Question of the Origin of Postural Nystagmus, Vestn. Otol., Rhinol. & Laryngol. 2:16-20, 1952.

6. Weeks, V. D., and Travell, J.: Postural Vertigo Due to Trigger Areas in the Sternocleidomastoid Muscle, Pediatrics 47:315-327, 1955.

7. Spiegel, E. A., and Scala, N. P.: Positional Nystagmus in Cerebellar Lesions, J. Neurophysiol. 5:247-260, 1958.

ADDITIONAL SOURCES

Cawthorne, T.: Positional Nystagmus, Ann. Otol., Rhinol. & Laryngol. 63:481-490, 1954.

Fletcher, R.: The Finding of Positional Nystagmus in the Dizzy Patient, Laryngoscope 60:532-542, 1960.

Ford, F. R.: Letter to Editor, Modern Medicine, pp. 158-162, Dec. 15, 1954.

Gordon, N.: Post Traumatic Vertigo with Positional Nystagmus, Lancet 1:1216-1218, 1954.

Hipskind, M. M.; Vertigo, Arch. Otolaryngol. 69, 1959.

Moriguti, S.: Comment on Question on Postural Imbalance, International Correspondence, Soc. Otolaryngol., 1960, p. 125.

Nylen, C. O.: Posture Test, Arch. Otolaryngol., supp. 109.

The nineteenth century added some special requirements of its own, which tended further to intensify the surgical type and to attract men to the practice of surgery whose sum of personality traits differed from those of men in other professions. The need for highly developed manual dexterity and for extreme speed created by the more complicated surgical techniques was one of these newer requisites.

Another demand on the surgeon was being created by the increasing number of operating amphitheatres and the growing numbers of spectators who came to see exhibitions of virtuosity. Each year more and more students crowded into the amphitheatres; more and more distinguished visitors arrived. The surgeon who could not operate before these spectators and remain calm and untroubled, he who could not perform with the brilliance which any sort of audience expects of any performer, lost out in the competition against men whose surgical skill was joined with an instinct for the dramatic.

The surgeon had become a showman and surgery a show. And inevitably some of the more spectacular surgeons, or those who could perform spectacular operations without flinching in the limelight, attracted attention outside the confines of the medical profession. Romance had come to surround the surgeon and his work. Some who became popular heroes, and on whom shone the fierce light of publicity, had no claim to their fame but their showmanship. Some were truly great surgeons. In the main the public choice was sound, and the surgeons who captured public imagination were men of merit.

These conditions produced the titans of surgery—Liston, Gross, Halsted, and in our times Crile, the Mayos and Harvey Cushing—for they attracted the bold, the confident, the talented, the self-assured. But they worked hardship on certain men who preferred the solitude of their laboratories to the crowded amphitheatre, and such men, unless their solitary experiments were of great importance, never won public acclaim.

*—Young*

Plastic and Reconstructive Surgery

# Planning the Integral Correction of the Human Profile

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BEAUTY is nothing more than the existence of harmony and proportion. The plastic surgeon attempts to create these or to reestablish them. Beauty does not exist as an abstract concept, any more than does an eternal and immutable type of beauty. Beauty is a *subjective* concept, dependent on historical, geographical, cultural and other diverse and complex influences. Nevertheless, there is a common denominator that serves as a basic principle: proportion.

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*The author describes and illustrates, with diagrammatic, photographic and roentgenographic representations, the great improvements in the human profile achieved by a plastic operation called by him "profiloplasty." The technic is fully described, and emphasis is placed on the psychic and social importance to the patient of such improvements, as well as on the surgeon's profound satisfaction in having accomplished them.*

The artist and the anthropologist know it well, although the anthropologist studies the normotype of a human group or a population according to its biologic and morphologic characteristics. By-passing aesthetic considerations, he finds that there are as many types of beauty as there are known cultures: there is the ideal beauty of the Greeks, of the Egyptians, of the Incas or of the Aztecs; and even the one forged by Hollywood.

The artist, on the other hand, deeply sensitive to the proportion of the individual subject and the manner in which it fits into the cultural background to which he belongs, creates a style and produces a pattern of beauty for his culture. We are in debt to him for the discovery that beauty, studied as proportion and harmony, is not so rare a quality as some would have us believe. What is truly rare is the ability to recognize it. Confusion arises from the acceptance of aesthetic standards which, although they meet the aesthetic demands of the culture to which they belong, may be foreign to other cultures.

In our times, commercial advertising, cinema and television, with deplorable lack of the aesthetic sense, are imposing upon us standarized forms of beauty as variable as the fashion.

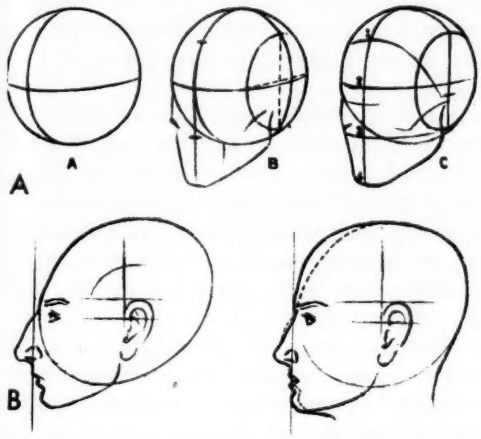


Fig. 1.—Sketches for guidance in correction of profile.

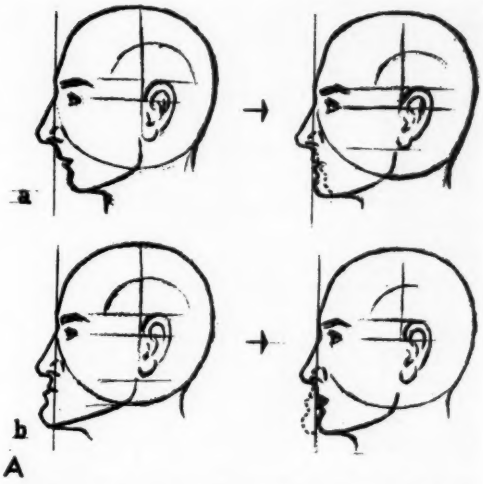


Fig. 2.—Sketches showing relation of face to head and neck.

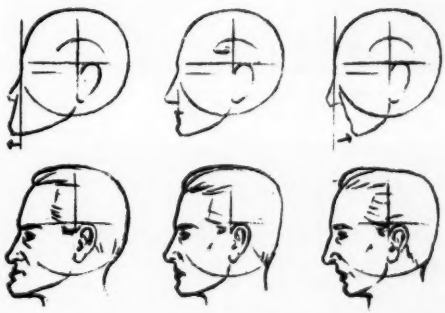

Fig. 3.—Sketches showing manner in which contour of forehead can be improved.

The plastic surgeon has much to learn from both the anthropologist and the artist. From the first he can learn methods of finding adequate formulas for his work. In contrast to him, this scientist, however, whose main interest is to determine the normotype by using both maximum and minimum as guides, the surgeon should study the various types existing in a population; and populations frequently consist of a complex biologic mixture.

The artist, on his side, teaches the plastic surgeon a valuable lesson by rejecting the imposition of foreign standardized types of beauty that confuse the people or culture to which he belongs.

If, as has been postulated, beauty is a matter of proportion and harmony, realization of this fact will enrich and universalize the aesthetic sense, which alone is sensitive enough to see it for what it is. The opposite result would follow if standardized types alone were considered acceptable.

Beauty is a matter of millimeters, but for each lacking or excessive millimeter of the external facial contour there is a mile of repercussion on the psychic and emotional reactions of the subject, who desires an operation to bridge the chasm from what he *is* to what he *wants* to be. This is his attempt to correct the perturbation his physical appearance has created in his mind. He seeks a means to be, to feel and to act like a normal human being.

The artist's own aesthetic sense supplies his rule of proportion in his subjective and objective experience. The plastic surgeon, even if he is an artist, must create rules that will allow him to plan the operative procedure and evaluate the results.

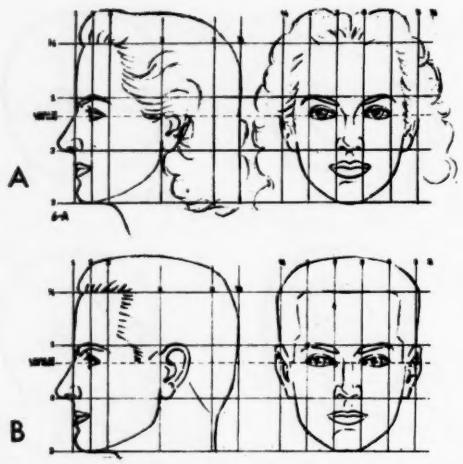


Fig. 4.—Sketches showing possibilities of improvement in nasomalar zygomatic compound.

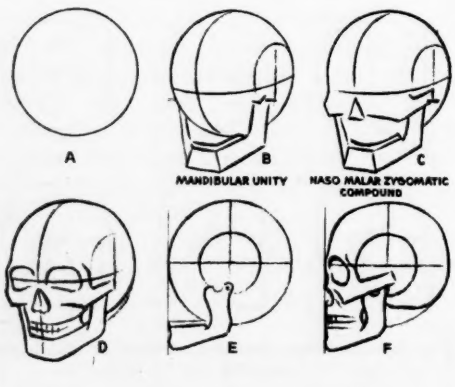


Fig. 5.—Sketches indicating possibilities on correction of retracted or overprominent mandible.

*Basic Principles.*—The plastic surgeon has been able to observe the important role that his skill can sometimes play in the correction of the face (Fig. 1). The reason for this change, often spectacular, is that the face is only a fraction of the cephalic extremity, and changes made on it can have a spectacular effect on its relation with the skull (Fig. 2).

It is now possible to modify the shape of the forehead. When it is receding, it can be brought forward (Fig. 3); when it protrudes, it can be camouflaged by bringing forward the lower two-thirds of the face.

Various technics are also available to modify the nasomalar zygomatic compound (Fig. 4*A*, *right*), thus changing the shape and position of the middle third of the face.

The position of the teeth and the shape of the upper maxillary bone (Fig. 4*B*, *right*) affect, to an important degree, the oral section of the face.

The mandible can be controlled as a unit; it can be made more prominent or retracted as required to correct the shape and proportion of the lower segment of the face. This helps to give the desired slant to the basic facial structure (Fig. 5).

The slant of the basic facial structure depends on the relation between the anterior and the transverse medial plane,

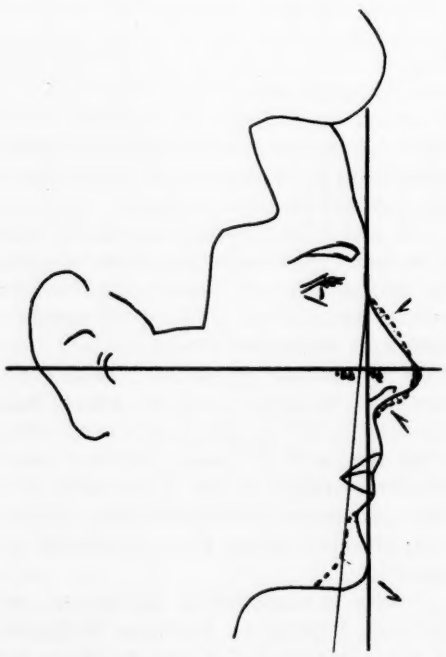

Fig. 6.—Slant of basic facial structure shown to depend on relation between anterior and transverse medial planes (see text).

and this relation can now be altered by the plastic surgeon (Figs. 6 and 7).

The correction of each separate feature (nose, lips or chin) has been long familiar in the field of plastic surgery. The sketch in Figure 7 does not represent a standard formula, but it can help the surgeon to analyze the features of the profile to be corrected. These standards were obtained from innumerable types created by as many artists. In studying them, one finds that all these types have the common denominator of proportion and, aside from individual differences, all coincide with the general pattern. Each surgeon should, however, create his pattern of beauty with as many variations as necessary according to the ethnic characteristics that prevail in his part of the world.

*Analysis and Project.*—Craniometric measurements, adopted internationally by anthropologists, have uniformity and objectivity. They can be used to advantage in making the morphologic problems of the

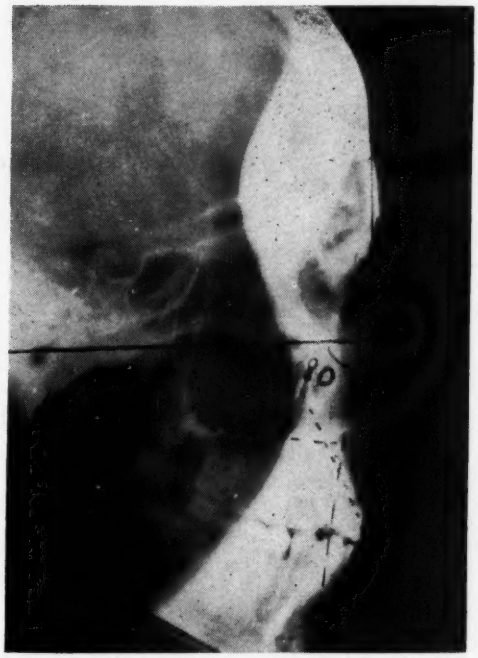

Fig. 7.—Roentgenographic illustration of point illustrated in Figure 6.

Fig. 8 *(Case 1).*—Preoperative and postoperative views.

Fig. 9 *(Case 2).*—Preoperative and postoperative views.

Fig. 10 *(Case 3).*—Preoperative and postoperative views.

face objective and measurable, and they enable the surgeon to judge accurately the effectiveness of the technics available for their correction.

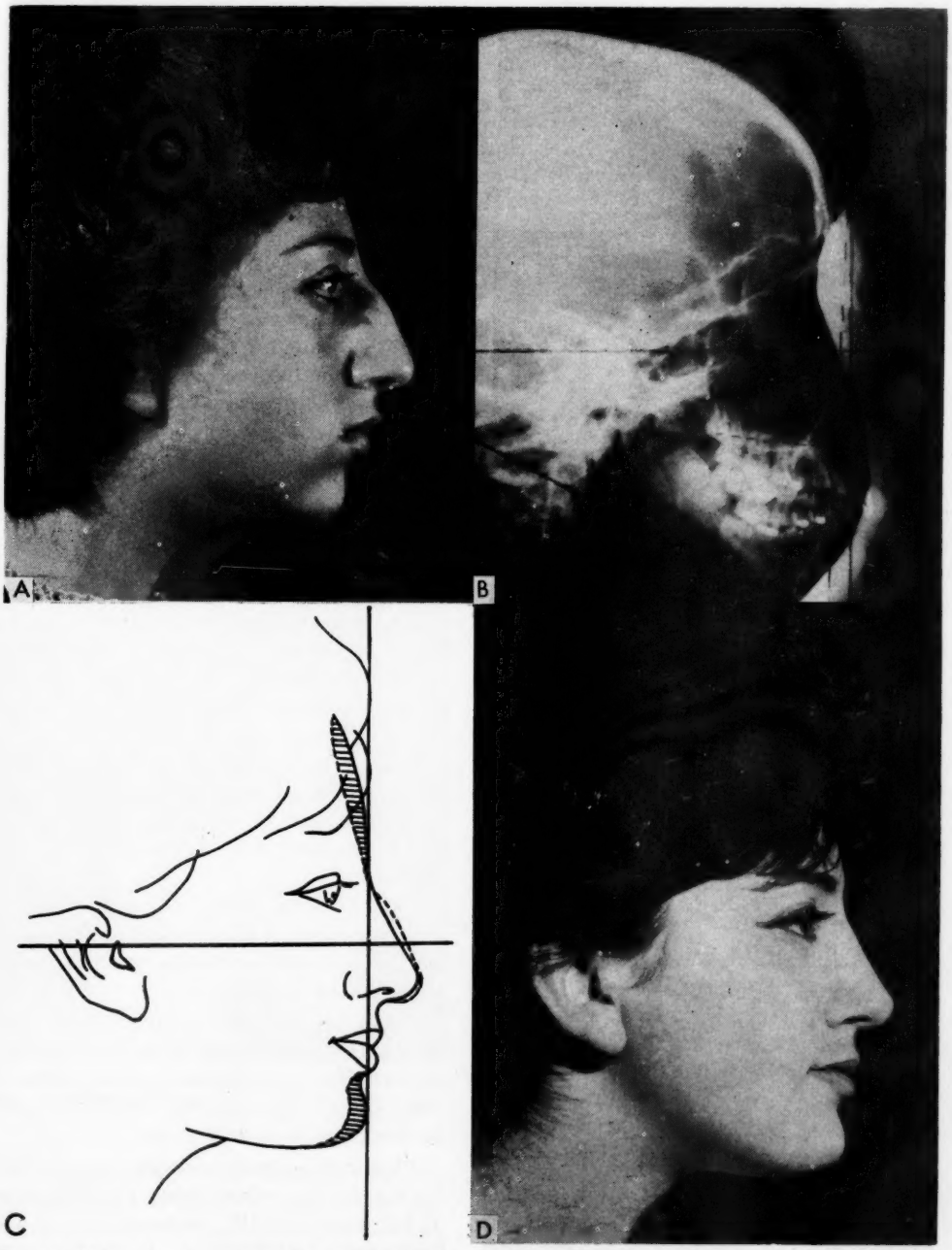


Fig. 11 *(Case 4).—A*, preoperative view of patient. *B*, roentgen study of skull. *C*, sketch indicates alterations needed. *D*, postoperative view.

*Cephalographic Study:* A tracing is made (Fig. 7) of Frankfort's plane (external auditory canal and lower ridge of the orbit) and the nasion-pogonion line which establishes, by its relation with the latter, the basic facial structure. These lines will show (by comparison to Figure 8) the prominence or retrusion of the forehead, the position of the base of the nose and the relation of the superior and inferior maxillary bones to the whole face. They also supply pertinent data on the position of the teeth.

Fig. 12.—Improvement of anthropoid profile to normal human contour.

*Photographic Study:* Roentgenographic study enables the surgeon to plan the correction of the bony structure itself by causing either retrusion or protrusion of the divers segments (forehead, base of the nose, teeth and mandible). Should the age or the condition of the patient prevent this course of action, the deformities of the osseous structure can be camouflaged by using inclusions covered by the muscles, adipose tissue and skin.

The photograph is placed on a negatoscope with translucent paper attached to it. The lines aforedescribed are traced, and, with them as an axis, the best possible profile for that particular patient's ethnic type is drawn (Fig. 11*C*). The exact degree of correction is obtained by superimposition of the planned profile upon the photograph of the patient's actual profile.

It is at this moment that the surgeon should make an appraisal of the surgical technics he has at his disposal, as well as of his own skill and experience in executing them.

I am working intensively toward a full understanding of the problems of the skull and face, as well as the many ethnic problems related to them.

Up to the time of writing I have performed 158 operations based on this conception. Their analysis, the tabulation of results and the technics employed will be described in a new paper.

*Planning in Particular Cases.*—In Case 1 (Fig. 8) the defects were (1) flattening of the nose and (2) moderate upper and lower dental protrusion. Correction consisted of lifting the nose. An orthodontic operation will be performed later.

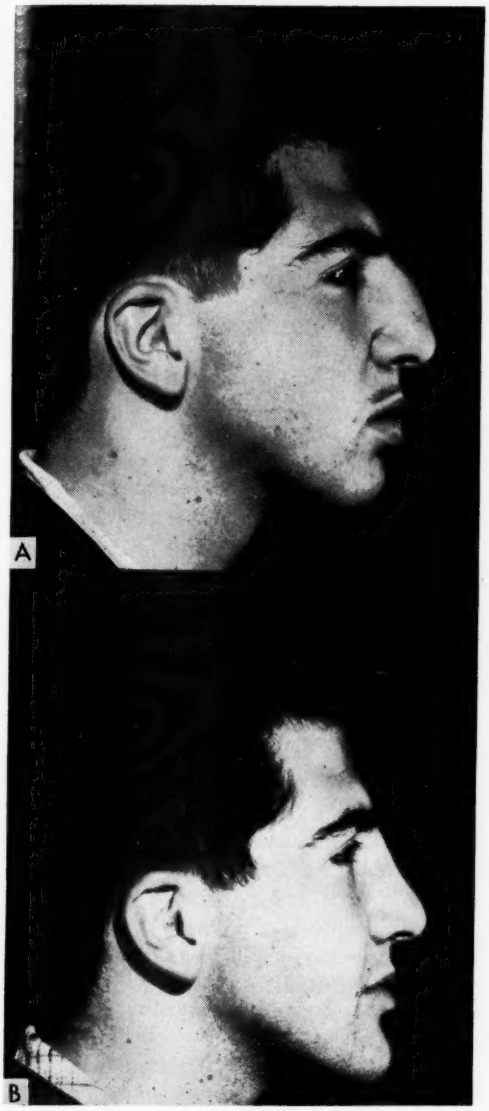


Fig. 13.—Distorted, unhappy, confused male patient transformed into happy, useful citizen capable of work, love and creative endeavor.

Fig. 14.—Transformation of painfully handicapped young woman into confident, attractive girl by profiloplasty.

In Case 2 (Fig. 9) the defects were (1) a large, humped nose, with descent of the columell, and (2) severe prognathism. Correction was achieved by performing rhinoplasty and dystrusion of the jawbone by means of a double condylectomy.

In Case 3 (Fig. 10) the defects were (1) a large, humped nose, with descent of the columella and a dropped lobe; (2) moderate upper dental protrusion, and (3) alteration of the facial contour by aging skin. Correction consisted of rhinoplastic

procedures. The degree of dental protrusion was not considered great enough to justify orthodontic surgical treatment.

In Case 4 (Fig. 11) the patient had (1) a "birdlike" face; (2) a receding forehead; (3) a humped nose, with descent of the columella and a dropped lobe; (4) micrognathia, and (5) dental protrusion. A cephalogram was taken; the patient was photographed, and the correction was planned in detail. It consisted of frontoplasty, rhinoplasty, mentoplasty and camouflage of the dental protrusion by correction of the chin.

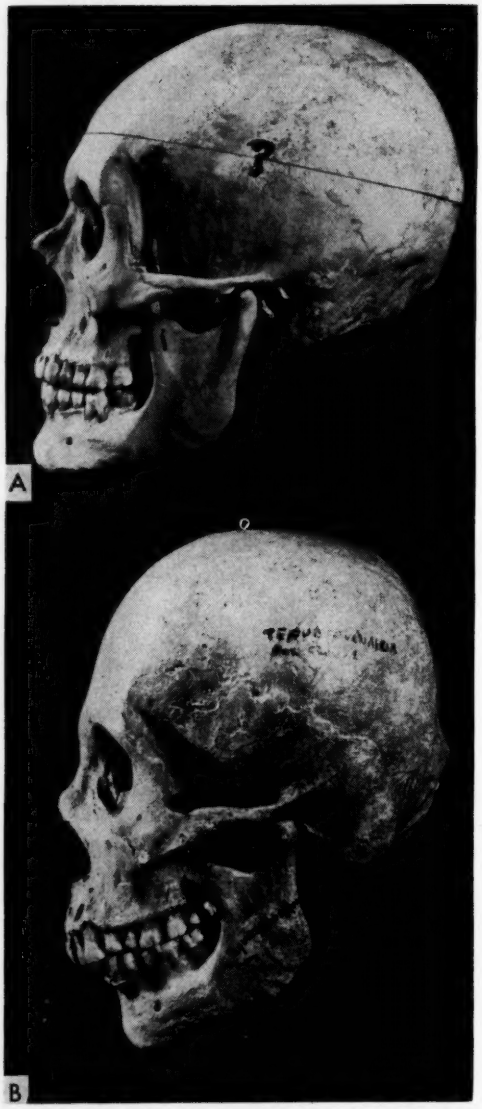


Fig. 15.—*A*, naturally well-formed skull, offering possibility of equal natural beauty without surgical aid. *B*, ugly, malformed skull, unfortunate possessor of which was doubtless equally unattractive.

SUMMARY

"Profiloplasty" is an operation that utilizes various surgical technics. It is based on an integral study of the human profile with the purpose of attaining proportion in its various segments, thus achieving beauty for the entire face.

Beauty is a matter of millimeters; surgical technics can now modify these measurements in one sense or another to produce results previously and accurately planned.

The author explains how he arrives at the concept of profiloplasty, the manner of making the diagnosis and the planning of integral correction of the profile.

The paper is documented with accounts of 150 personal cases. Photographs of the results obtained in 5 cases are also presented.

Technical details, as well as an evaluation of the various surgical technics involved in the achievement of profiloplasty, will be the subject of another paper.

RÉSUMÉ

La "profiloplastie" est une opération utilisant diverses techniques chirurgicales. Elle est basée sur une étude intégrale du profil humain en vue d'atteindre à des proportions harmonieuses à ses différents niveaux, réalisant ainsi la beauté du visage dans son ensemble.

La beauté est une question de millimètres; les techniques chirurgicales per-

mettent maintenant de modifier les mesures dans un sens ou dans l'autre, en vue d'obtenir les résultats désirés selon un plan judicieusement établi au préalable.

L'auteur explique comment il arrive à la conception de la profiloplastie, la façon de poser le diagnostic et de fixer un plan pour la correction intégrale du profil.

Le travail présenté comprend 150 cas personnels; il est accompagné de photographies illustrant les résultats obtenus dans 5 cas.

Les détails techniques ainsi que l'étude des diverses techniques chirurgicales nécessitées par la réalisation de la profiloplastie feront l'objet d'un travail ultérieur.

RESUMEN

Se denomina profiloplastia una operación que, mediante diversas técnicas, busca el logro de unas proporciones adecuadas entre las partes que forman el perfil corporal y de este modo lograr la belleza del conjunto.

La belleza es una cuestión de milímetros; y estas medidas pueden modificarse a voluntad quirúrgicamente para lograr los resultados apetecidos.

El autor explica cómo llegar al concepto de profiloplastia, cómo hacer el diagnóstico, y cómo plantearse la corrección integral del perfil corporal.

Este artículo está ilustrado con 150 casos personales, de los que se presentan cinco fotografías.

En otro artículo el autor expondrá los detalles técnicos y una crítica de los distintos procedimientos a emplear.

RIASSUNTO

La "profiloplastica" e' un intervento che si vale di varie tecniche chirurgiche ed e' basato su uno studio integrale del profilo umano allo scopo di raggiungere la proporzione fra le varie parti e donare la bellezza alla faccia.

La bellezza e' talvolta questione di millimetri; la tecnica chirurgica e' ora in grado di modificare le misure in un senso o nell'altro per ottenere i risultati prefissi secondo un piano accuratamente prestabilito.

L'autore spiega come si giunge al concetto di profiloplastica, come si fa la diagnosi e come si prestabilisce la correzione integrale di un profilo. L'articolo e' documentato da 150 casi personali; di 5 vengono presentati i documento fotografici.

I dati tecnici e la valutazione delle diverse techniche chirurgiche formano l'oggetto di un altro lavoro.

ZUSAMMENFASSUNG

Die "Profilplastik" ist eine Operation, die sich verschiedener chirurgischer Techniken bedient. Sie beruht auf einem umfangreichen Studium des menschlichen Profils und verfolgt den Zweck, Proportionen der verschiedenen Abschnitte des Profils herbeizuführen und auf diese Weise das ganze Gesicht zu verschönen.

Schönheit ist eine Sache von Millimetern; chirurgische Techniken können jetzt solche Maasse in einer oder der anderen Richtung verändern, um Erfolge zu erzielen, die sorgfältig im Voraus geplant sind.

Der Verfasser erklärt, wie er auf die Konzeption der Profilplastik gekommen ist, wie er seine Diagnose stellt und wie er eine Gesamtkorrektur des Profils plant.

Die Arbeit beruft sich auf 150 eigene Fälle des Verfassers, und die Erfolge, die an fünf Fällen erzielt wurden, werden photographisch dargestellt.

Technische Einzelheiten und eine Auswertung früherer chirrurgischer Techniken, die zu den Erfolgen der Profilplastik beigetragen haben, werden der Gegenstand einer weiteren Arbeit sein.

# Emergency with Delayed Operation for Wounds of the Limbs

MARC ISELIN, M.D., F.I.C.S.
PARIS, FRANCE

IN 1956 I coined the term "delayed emergency" or, rather, "emergency with delayed operation." In 1957, at a general meeting of the International College of Surgeons in Geneva, I explained its meaning. The term denotes what I consider the modern concept of an emergency; i.e., because of the technics and drugs currently available, the surgeon is no longer compelled to define an emergency in terms of time alone.

Thanks to aspiration and re-equilibration in the care of most abdominal emergencies, it is now generally recognized that in this field the surgeon can take time to prepare his patient and operate only when he has brought him into the optimal condition for that purpose. Nevertheless, even after I had adopted this principle for intestinal obstruction, perforated ulcer and other abdominal conditions, I hesitated to extend it to wounds, having been taught for years that the sooner the operation was performed the better the result would be. Inevitably, however, I realized that the antibiotics and antiseptics extend for days the "lag" in time between the injury and the pullulation of bacteria—a lag long enough to permit surgical intervention but limiting its use to a very short time—six to ten hours—after the injury.

So much having been admitted, it became obvious that delaying the operation would permit absolutely meticulous preparation of the skin (indispensable for any surgical procedure) and adequate preparation of the general and mental condition of the patient. In 1958, therefore, I began to treat wounds of the limbs according to the technic here described.

When a patient comes to the hospital with an injury of the hand or of the leg, he is not operated on immediately. He is put in bed and submitted to the following preparation:

*Local.*—The limb is bathed in a solution of quaternary ammonium (I use Cetavlon), shaved, cleaned and, after about fifteen minutes, splinted and wrapped in a wet dressing soaked with Cetavlon.

Read at the Twenty-Sixth Annual Congress of the North American Federation, International College of Surgeons, Chicago, May 14-18, 1961.
Submitted for publication June 2, 1961.

*The author points out that the availability of antibiotics, together with modern antiseptic measures, has made it possible for operation in cases of emergency, including trauma to the limbs, to be delayed until the patient has been brought into optimal condition both physically and mentally. This eliminates the danger of infection of the wound and in the author's hands has saved a number of limbs which, had operation been performed immediately, would have been amputated.*

*General.*—General preparation is threefold, as follows:

1. Administration of antibacterials. I give penicillin-streptomycin routinely and have had no trouble.

2. Maintenance of water, ionic blood and protein balances, according to the severity of the trauma and the patient's reaction.

3. Antistress measures. As a routine, I give each patient 3 tablets daily, for one month, of Procalmadiol.

The dressing is removed the next day; a new bath with Cetavlon is given; the wound is examined, and the general status of the patient is appraised. The limb is then dressed and immobilized.

When the skin is perfectly clean and the patient is quiet and gives the impression of being in good condition, the operation can be performed.

The minimal delay, in my own opinion, is two days for the clean wound inflicted by sharp laceration. For crush injuries and injuries due to automobile accidents, four days is the average time. For wounds examined late, and infected or potentially infected on arrival, I wait longer (in 2 cases, for eleven days) to gain the necessary time for mastering the infection and operating without danger.

## COMMENT

The advantages of this revolutionary technic are numerous and important. First, it eliminates all danger of wound infection. Second, it provides an easy solution of the difficult problem of wound excision. Within two or three days the necrotic part becomes dark and clearly demarcated from the living tissue, which remains pink. On some occasions, fingers which, on first examination, seem certain to be lost by amputation will appear quite normal after the delay. On the other hand, flaps which at first looked quite healthy become necrotic and have to be excised. The part operated on, properly splinted and free of both infection and secondary necrosis, does not become edematous. Healing is quicker and of better quality than with the old methods.

Furthermore, three years' experience with hundreds of patients has taught me two general consequences:

1. The initial operation, which, according to the classic principle upheld since 1917, was intended to prevent the development of wound infection through careful wound excision followed by covering (with skin sutures or a graft), has changed its meaning, as infection, in modern practice, is quite adequately controlled by antiseptics and antibiotics.

2. The initial operation under the new conditions can be definitive, with excision of any part that cannot live and repair of everything that needs repair—skin, bones, joints, tendons and nerves.

I call this conception "global surgery," because its aim is—instead of leaving the task of reconstruction for secondary operations—to do all necessary repairs at once.

It is surely unnecessary to insist further on the advantages of this method, which saves suffering, time and money and solves one of the most difficult problems of organization in surgery, namely, the treatment of emergencies.

The term "emergency with delayed operation" means that the emergency still exists and that the wounded must be taken at once to a hospital but that the operation will be performed only when, in the surgeon's judgment, the local and general condition of the patient has been brought to its best.

Such management is well accepted by the patient and its advantages readily admitted by the physician after the necessary explanations. Nevertheless it is much more difficult to persuade the surgeons, who are necessarily too much oppressed by what they have been taught,

by their long experience with the classic methods and by their heavy sense of responsibility with regard to following revolutionary concepts.

Yet "emergency with delayed operation" is only the application of a more general idea, which governs modern surgery in general: The preoperative treatment is the most important, and the time and care accorded to it will eliminate or greatly diminish the postoperative problems and complications.

RIASSUNTO

Con il termina di "Urgenza con intervento rimandato" l'autore intende que l'urgenza continua a sussistere rigardando la rapida ospedalizzatione del paziente; ma l'intervento chirurgico sara rimandato e verra eseguito solo dopo accurata preparazione. Nella pratica chirurgica moderna, infatti, la preparazione del malato deve essere spesso considerata come la parte essenziale del trattamento.

ZUSAMMENFASSUNG

Unter der Bezeichumg "Dringlichkeit mit aufgeshobener Operation" versteht der Verfasser dass die Dringlikeit für die schnelle Aufnahme ins Krankenhaus fortbesteht; aber die Operation nur ausgeführt werden kann, nachdem genügend Zeit auf sorgfältige Vorbereitung zur Operation aufgewandt worden ist. Es darf nicht vergessen werden, dass in der modernen Chirurgie die Vorbereitung zur Operation oft die lebenswichtigste Phase der Behandlung darstellt.

RESUMEN

El autor define el termino "urgencia con operation diferida" como indicación que la urgencia continua por la rapida hospitalizacion de del enfermo; peró la intervención sero diferida por el tiempo necessario a la preparacion adecuada para la intervención. En la cirugia moderna debe tenerse presente que la preparación es a menudo la fase mas importante del tratamiento.

RÉSUMÉ

L'auteur définit le terme d' "opération en urgence différeé" comme indiquant que l'urgence persiste pour l'hospitalization du patient; mais l'operation ne peut etre pratiquee qu' après le temps reservé a une preparation adequate. En pratique chirurgicale moderne, il faudrait ne pas méconnaître que la préparation est souvent la phase thérapeutique la plus vitale.

The past may be compared to a shrine in the coign of some sea-cliff, whither the white birds of recollection come to roost and rest awhile and fly away again into the darkness. But the shrine is never deserted. For away up from the horizon's line other white birds come wheeling and circling to take the place of those that have left and are leaving.

—*Moore*

# Sección en Español

# Aneurisma de la Carotida Interna

## (Aneurysm of the Carotid Artery)

JOSÉ YOEL, M.D., JOSÉ ALBERTO CERISOLA, M.D.,
Y BERNARDO GOLDSTEIN, M.D.

BUENOS AIRES, ARGENTINA

*A case of cervical aneurysm of the internal carotid artery is reported in which resection with a termino-terminal anastomosis was performed. During the exeresis and suturing the cerebral circulation was controlled by an external shunt. The patient was cured and presented no further neurologic symptoms.*

Los aneurismas carotídeos son poco frecuentes, y su tratamiento desalentado por la gran mortalidad o importantes secuelas nerviosas debidas a defectos en la irrigación cerebral.

En el caso que motiva esta presentación, hemos efectuado lo que consideramos el tratamiento moderno e ideal de los aneurismas carotídeos, o sea la resección y anastomosis término-terminal manteniendo la circulación cerebral mediante el sultado desconocido.

*Historia.*—Reid[1] recopila todos los aneurismas tratados en el Johns Hopkins Hospital desde su apertura hasta 1922, encontrando 12 casos de aneurisma de carótida sobre un total aproximado de 120 casos; 10 de ellos eran de carótida común, 1 de carótida externa, y 1 de carótida interna. (De ahora en adelante al mencionar a los aneurismas de la carótida interna nos referimos a los de localización cervical exclusivamente, no a los intracraneanos, que son tributarios de la neurocirugía y que parecen ser mucho más frecuentes.) De estos casos, 4 fueron curados por ligadura proximal o combinada, otros 4 pacientes murieron, hubo 2 hemiplejias y 2 de resultado desconocido.

Matas[2] publicó 42 casos recopilados en un lapso de 52 años (1888-1940). Todos fueron tratados por ligaduras y hubo 5 muertes.

Elkin[3] en 1932 comunicó 5 aneurismas de la carótida, sobre un total de 62 aneurismas. Todos fueron tratados por ligadura parcial; 4 enfermos curaron y el 5° tuvo una hemiplejia.

Kirby[4] señala que desde 1927 a 1947 (periodo de 20 años), en el Hospital de la Universidad de Pennsylvania se vieron 5 aneurismas de este tipo.

Pataro[5] en 1943 publica un caso de aneurisma carotídeo tratado en una primera etapa con la ligadura parcial con bandeleta de aluminio.

Shea[6] ha publicado un caso de aneurisma carotídeo tratado con resección y anastomosis entre las carótidas común e interna. Se obtuvo buen resultado.

Spencer[7] en 1957 publica un caso de

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aneurisma de la carótida común, tratado con resección y sutura término-terminal. Para ejecutar la sutura arterial se debió suspender la circulación cerebral durante 19 minutos. El enfermo curó sin secuelas neurológicas.

Boatman y Bradford (1958) publican un caso de aneurisma de la carótida interna operado durante el embarazo, empleando hipotermia y un shunt vascular para mantener la circulación cerebral durante la confección de la sutura. Se obtuvo un éxito terapéutico.

De Bakey y col.[8] publican el reemplazo de la carótida por prótesis de dacron o teflon, utilizando durante la colocación del injerto un shunt externo para mantener la circulación cerebral.

De Bakey y Crawfoord[9] preconizan el uso de un shunt para mantener la circulación cerebral durante la oclusión carotídea.

*Etiología.*—El 90% de los aneurismas de la carótida común son de origin luético. Como las manifestaciones tardías de esta enfermedad hoy día son menos frecuentes que otrora, los aneurismas son raros.

Los aneurismas espontáneos de la carótida interna son generalmente de origen congénito. Otros factores concurrentes citados, son la hipertensión arterial y la arterioesclerosis. Un grupo aparte obedece a una etiología traumática.

*Tratamientos propuestos.*—1. *Ligadura:* Cualquier tratamiento quirúrgico de los aneurismas carotídeos que implique la suspensión momentánea o definitiva del flujo

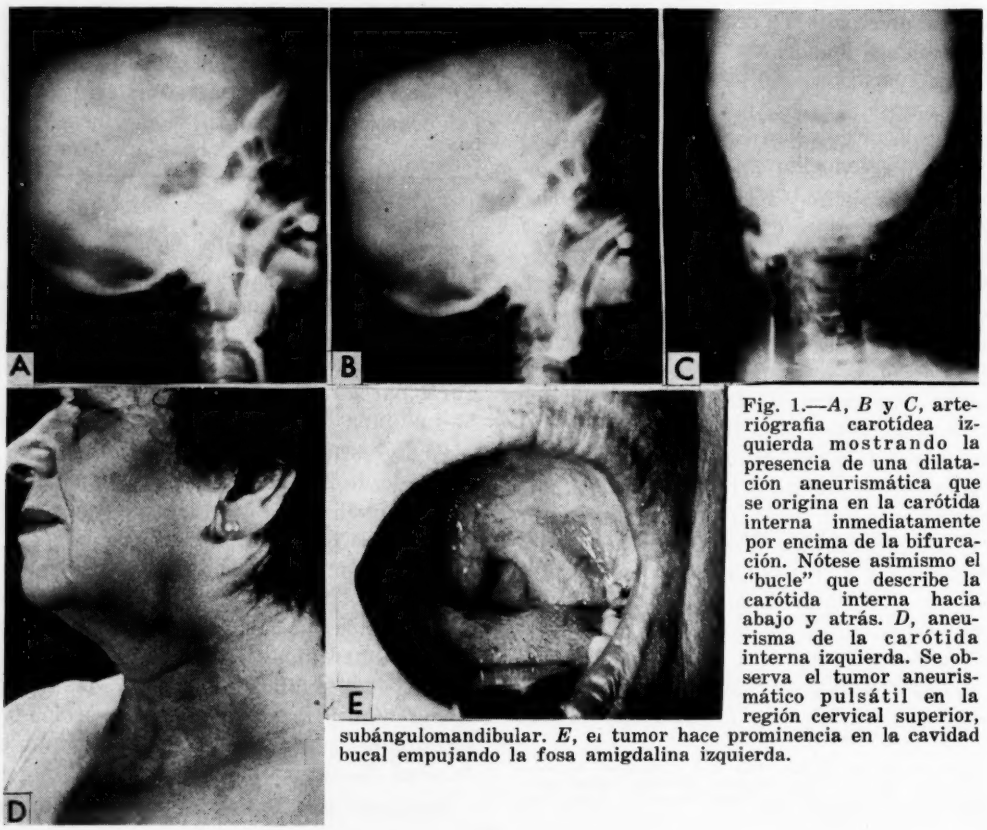


Fig. 1.—*A*, *B* y *C*, arteriógrafia carotídea izquierda mostrando la presencia de una dilatación aneurismática que se origina en la carótida interna inmediatamente por encima de la bifurcación. Nótese asimismo el "bucle" que describe la carótida interna hacia abajo y atrás. *D*, aneurisma de la carótida interna izquierda. Se observa el tumor aneurismático pulsátil en la región cervical superior, subángulomandibular. *E*, el tumor hace prominencia en la cavidad bucal empujando la fosa amigdalina izquierda.

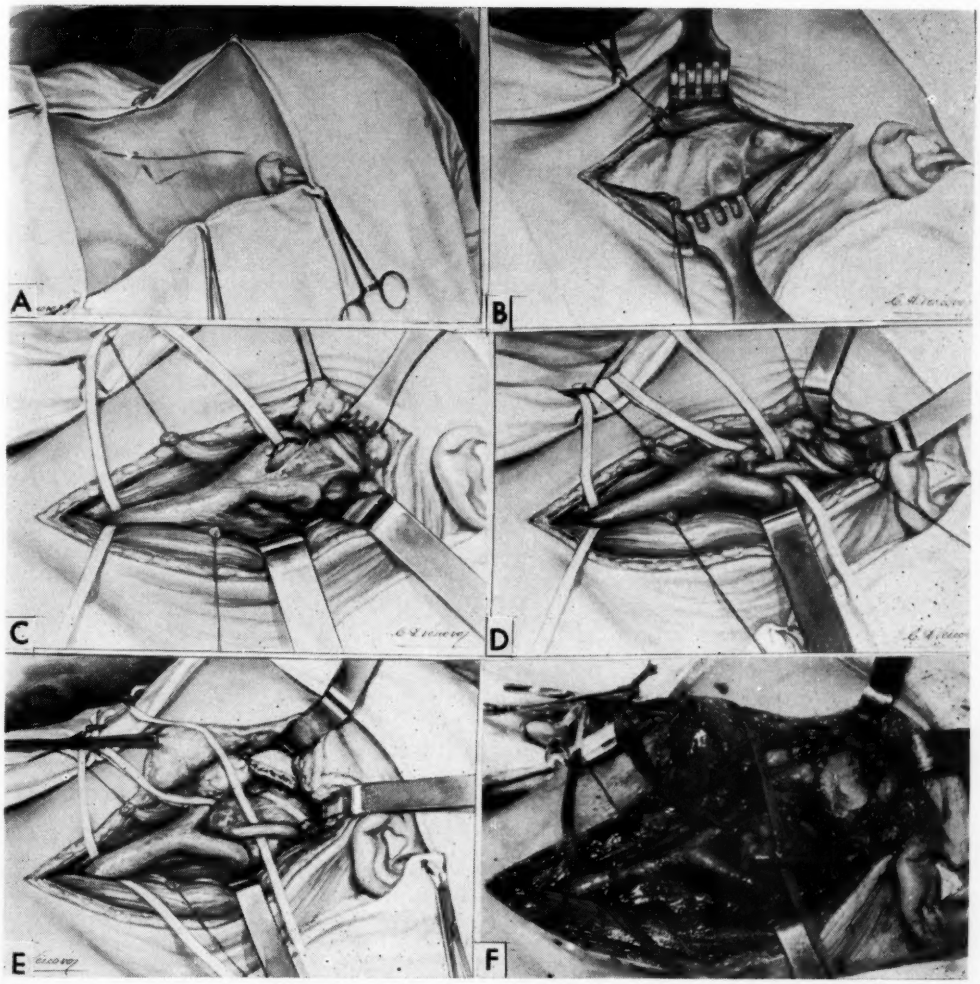


Fig. 2.—*A*, enferma en posición operatoria. La incisión va desde 2 cm. por debajo del lóbulo de la oreja hasta la inserción esternal del E/C/M/ y siguiendo el borde anterior de éste. La parte superior de la incisión emplazada sobre el relieve del aneurisma. *B*, disecados los bordes de la herida se rechaza hacia atrás el E.C.M. Se observa la prominencia del aneurisma en la parte superior. Se ha cortado el músculo omohiodeo cuyos cabos aparecen reparados. *C*, se han pasado las cintas de hilera por las carótidas primitiva y externa. La carótida interna presenta un bucle en comunicación con el aneurisma. Sobre éste se vé el nervio hipogloso con su asa descendente y el músculo digástrico. *D*, se ha pasado la cinta por detrás de la carótida interna disecada por encima del aneurisma. Arriba se vé el hipogloso y el músculo digástrico con doble ligadura antes de ser seccionado. *E*, ampliación del campo operatorio prolongando hacia arriba la incisión con un trazo prearicular y hacia adelante con untrazo anterior perpendicular al extremo superior de la incision; resección del ángulo mandibular y sección del digastrico. *F*, fotografía operatoria esquematizada en la Fig. 2*E*.

sanguíneo por una de las carótidas, tiene como grave riesgo la gran frecuencia de lesiones neurológicas, observadas desde el 30% al 60% de los casos tratados, y generalmente graves (hemiplejias). Estas lesiones pueden aparecer cuando la suspensión circulatoria dura más de 5 minutos; A veces solo se hacen ostensibles clínica-

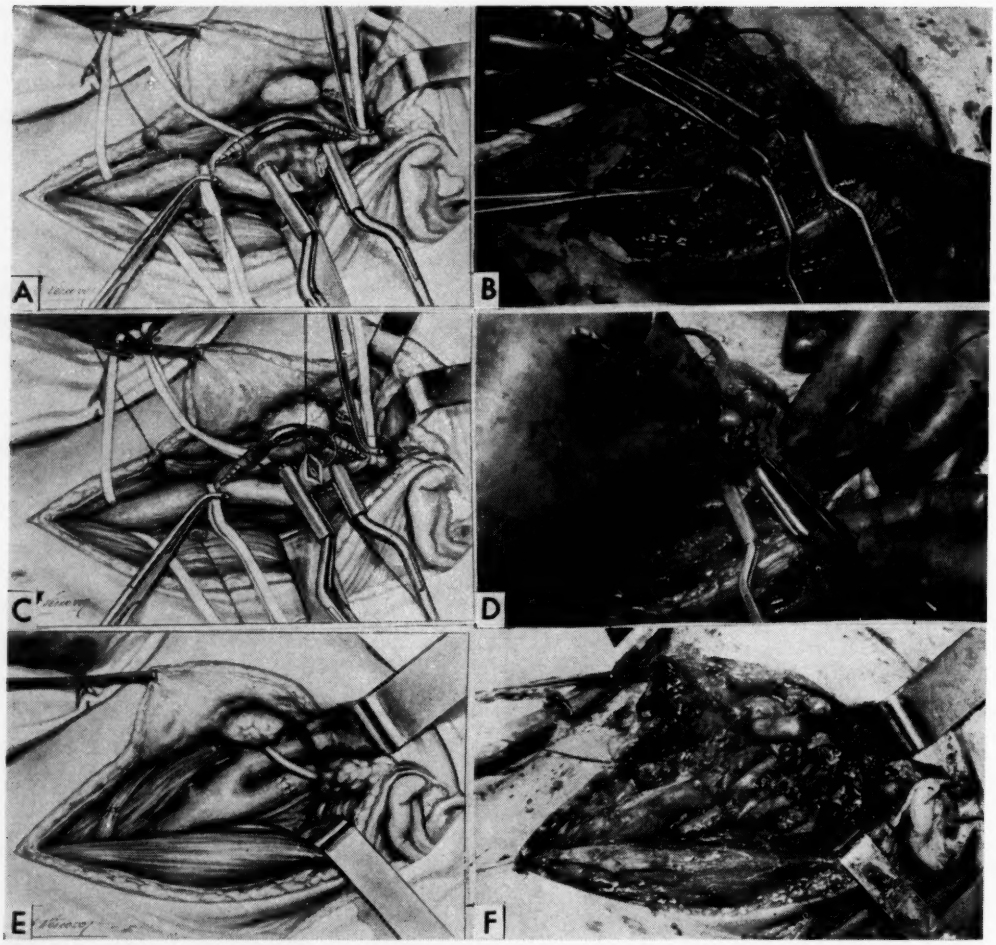


Fig. 3.—*A*, se ha colocado el shunt externo asegurando las agujas en los sitios de punción apretando la cinta de hilera sobre la carótida interna y una cuarta cinta pasada por la carotida primitiva. Las cintas ajustadas sobre los vasos son mantenidas con pinzas en angulo recto para ligaduras. Se ha resecado una porción de más de 3 cm. de carótida interna colocando clamps arteriales en ambos extremos. *B*, fotografía operatoria esquematizada en la 3*A*. *C*, anastomosis término-terminal de la carótida interna. Se han colocado los puntos directores y se comienza la sutura. *D*, fotografía operatoria esquematizada en la Fig. 3*C*. *E*, anastomosis terminada. Se ha suturado el músculo omohioideo. Se vé la glándula submaxilar hacia arriba y adelante. Se ha resecado el tumor aneurismático. *F*, fotografía operatoria esquematizada en la Fig. 3*E*.

mente a los dos o tres días de la oclusión. Estos accidentes que se observan cuando se actúa sobre la carótida común, aumentan notablemente cuando la ligadura se emplaza en la carótida interna. Ligando la común, la circulación puede mantenerse relativamente por vía retrógrada carótida externa-carótida interna, y esta vía supletoria es la que explica la menor incidencia de complicaciones. Pilcher y Thuss,[10] publican una incidencia de complicaciones cerebrales en el 20 a 30% de los casos.

Freeman comunica complicaciones neurológicas en el 20 a 25%. Matas dá una

mortalidad del 12% debida a la ligadura carotídea. Watson y Silverstone[11] comunican complicaciones neurológicas en el 70% de los enfermos tratados y un 50% de mortalidad. De lo expuesto se deduce el grave riesgo que supone la ligadura de

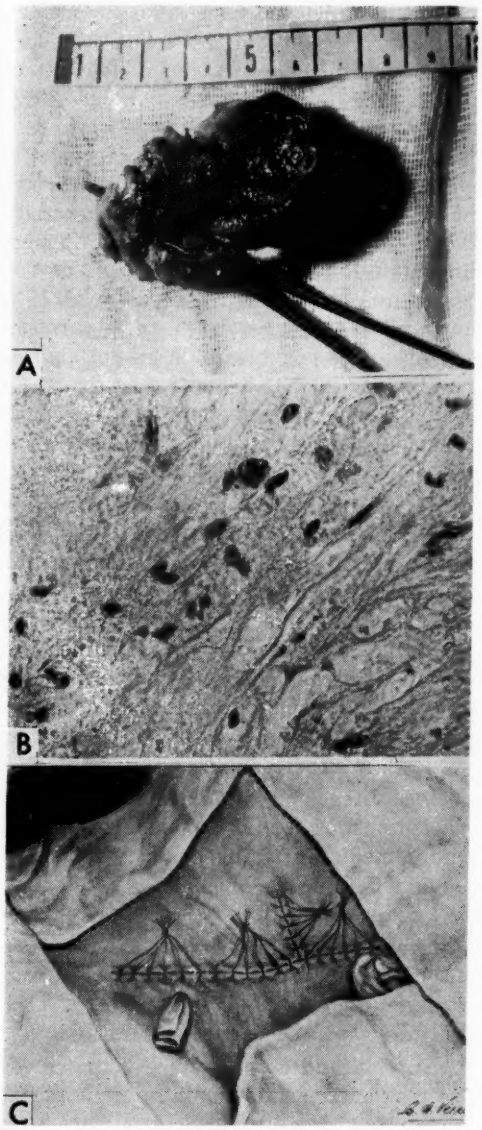


Fig. 4.—*A*, fotografía del aneurisma resecado en comunicación con la carótida interna. *B*, microfografía de la pieza. Dr. Polak Protocolo 44.842 "Aneurisma de arteria carótida interna con intensos fenómenos de hialinización y calcificación." *C*, sutura final. Se ven las ampliaciones de la incisión aprovechando el pliegue preauricular hacia arriba y hacia la región submaxilar adelante.

Fig. 5.—Resultado a los 20 días de la intervención.

las carótidas común e interna como tratamiento de los aneurismas. La ligadura de la carótida externa es innocua, aún cuando se practique bilateralmente.

Con el objeto de disminuir la frecuencia de complicaciones cerebrales se han propuesto diversos tests para medir la sensibilidad del tejido nervioso a la isquemia producida por la compresión carotídea. La prueba preconizada por Matas o las variaciones de la misma, de comprimir la carótida interna, incluso explorándola quirúrgicamente con anestesia local, no ha dado resultados veraces pues la hemiplejia ha aparecido a las horas o días de haber sido afectuada la ligadura, a pesar del resultado negativo del test.

2. *Ligadura Gradual de la Carótida:* Se han propuesto diversos dispositivos o instrumentos, como así mismo bandas de fascia o de aluminio, que ocluyendo paulatinamente la luz arterial darían tiempo a la instauración de una adecuada circulación colateral por el polígono de Willis, lo que atenuaría grandemente la incidencia de complicaciones. El inconveniente de este procedimiento, segun algunos autores, es la aparición de hemorragias secundarias por erosión de la pared arterial.

3. *La Aneurismorrafia:* Este es uno de los clásicos procedimientos preconizados por Matas, pero pocas veces puede utilizarse dado las características anátomopatológicas de estos aneurismas. Es útil en los falsos aneurismas o en los saculares.

4. *Resección del Aneurisma y Anastomosis Término-Terminal:* Es indiscutiblemente el procedimiento de elección a utilizar en cualquier tipo de aneurisma.pues reseca la zona patológica de la arteria y practica la anastomosis término-terminal de los cabos. Si la distancia entre éstos no permitiera la sutura arterial se debe proceder a la colocación de un tubo de dacron o teflon. Este tipo de cirugía tiene el grave inconveniente que supone interrumpir mediante clamps la circulación carotídea para efectuar las maniobras de ectomía y anastomosis. Con el fin de obviar esta dificultad han sido propuestos diferentes "shunts" o tubos plásticos cortocircuitos de polietileno, que ubicándose por dentro (shunt interno) o por fuera (shunt externo) de la luz arterial, permiten mantener una adecuada circulación cerebral durante la oclusión de la zona aneurismática. El shunt externo consta de un tubo de polietileno de 3 a 5 mm de diámetro que lleva colocadas en cada extremo una aguja corta y gruesa (25/18 o 14 gauge) que se insertan en la carótida por encima y por debajo de los dos clamps que limitan la zona arterial a resecar. Es necesario para mantener una adecuada irrigación cerebral por medio de este dispositivo:

1. Mantener y aún elevar la tensión arterial del paciente a 200 mm de sistólica por medio de soluciones endovenosas de noradrenalina a perfusión contínua gota a gota. De la misma manera hay que reemplazar cualquier pérdida sanguínea mediante transfusión peroperatoria y evitar las drogas que pudieran causar eventualmente hipotensión arterial (premedicaciones, barbituricos, etc.).

2. Mantener incoagulable la sangre del paciente durante el funcionamiento del shunt mediante la inyección intraarterial de 50 a 100 mg. de heparina.

A continuación relatamos la historia clínica de nuestro caso e ilustramos la técnica operatoria seguida para la solución del mismo.

H.de F. 61 años. Alemana. Casada.

*Enfermedad actual:* Hace 7 meses empezó su enfermedad con la aparición de un tumor en región cervical superior izquierda y parte de región submaxilar. El tumor fué aumentando gradualmente de tamaño hasta adquirir los caracteres actuales. Una angiografía hecha hace tres meses muestra la presencia de un aneu-

risma de la carótida interna (Fig. 1, *A*, *B* y *C*). No ha tenido más sintomatología subjetiva que cefaleas intermitentes.

*Estado actual:* Al examen se comprueba tumor en región cervical superior izquierda de 4 x 4 x 4 cm., pulsátil, elástico, ligeramente doloroso (Fig. 1*D*). Por vía bucal hace procidencia levantando la fosa amigdalina izquierda (Fig. 1*E*).

Al tacto pulsa y es ligeramente doloroso. Examen general: nada de particular. Serología para sífilis: Wassermann, Kahn St. y presuntiva: Negativas. Tensión arterial Mx. 160 Mn. 100.

*Protocolo Operatorio.—Anestesia:* general pentothal-novocaína con intubación endotraqueal. Incisión: desde 2 cm. por debajo del lóbulo de la oreja izquierda sigue el borde anterior del E.C.M. hasta su inserción esternal (Fig. 2*A*). Disecados los bordes de la herida se rechaza el E.C.M. hacia atrás, se cortan y reparan los cabos del omohioideo (Fig. 2*B*), se investiga la carótida primitiva y se le pasa una cinta de hilera; se hace lo mismo con la carótida externa (Fig. 2*C*).

Se diseca la carótida interna que presenta un bucle que ya se veía en la arteriografía preoperatoria, y a unos 3 o 4 cm. de la bifurcación; dicha arteria forma cuerpo con el tumor aneurismático del cuál es imposible separarla por lo menos en un trayecto de 3 cm.

Se continúa la disección hacia arriba, se encuentra el nervio hipogloso y su asa descendente. Finalmente se consigue pasar un lazo por la carótida interna a 1½ cm. de la base del cráneo (Fig. 2*D*).

Para aumentar el campo operatorio, se amplía la incisión primero con un pequeño trazo preauricular y luego con una incisión anterior de unos 5 cm. perpendicular a la ya efectuada. La resección del gonion, la ligadura de las arterias lingual, tiroidea y facial y la sección del digástrico que cubría el aneurisma dã un amplio campo (Fig. 2, *E* y *F*).

Se coloca el bypass entre la carótida primitiva y el extremo superior de la interna, las agujas que perforan la pared arterial se adosan a la misma por medio de cintas de hilera que se ajustan con pinzas doble utilidad. Se colocan los clamps arteriales sobre arteria sana y se procede a resecar la zona aneurismática (Fig. 3, *A* y *B*). Se aproximan los cabos tomados con clamps y se comienza la anastomosis empleando agujas atraumáticas con seda 000000 (Fig. 3, *C* y *D*). Terminado el cierre se constata la permeabilidad de la sutura, lo que obliga a colocar unos puntos de refuerzo, técnicamente difíciles por la fragilidad de la pared vascular. No obstante, el cierre es satisfactorio y la hemostasia perfecta (Fig. 3, *E* y *F*). Desde el momento de la colocación del shunt y hasta terminada la sutura y quitados los clamps se heparinizó a la enferma con 100 mg. de heparina intracarotídea y se le elevo'la tensión arterial a 200 mm. Hg por medio de una solución intravenosa de noradrenalina. Se cubre la zona con gasa reabsorbible y se deja como avenamiento un tubo de goma y gasa que se saca por contrabertura. Sutura de la herida con puntos separados (Fig. 4*C*).

*Evolución postoperatoria.*—A la semana se sacó el avenamiento y los puntos. Herida bien. Excelente postoperatorio. No se observan secuelas neurológicas. A los 8 días es dada de alta en óptimo estado.

A los tres meses de la intervención la enferma se encuentra totalmente restablecida sin nigún tipo de secuela.

RESUMEN

Se presenta un caso aneurisma cervical de la carótida interna, tratado con resección y anastomosis término-terminal. Durante la exéresis y sutura se mantuvo la circulación cerebral por medio de un "shunt" externo. La enferma curó sin secuelas neurológicas.

REFERENCES

1. Reid, M. R.: Aneurysm in the Johns Hopkins Hospital, Arch. Surg. **112**:1, 1926.
2. Matas, R.: Classified Summary of 620 Operations on the Blood Vessels for all Causes, Tr. Am. S. A. **58**:335, 1940.
3. Elkin, D. C., and Campbell, J.: Aneurysm: A Review of Sixty-Two Cases, Am. J. Surg. **24**:611, 1934.
4. Kirby, C. K.; Johnson, J., and Donald, J. G.: Aneurysm of the Common Carotid Artery, Ann. Surg. **130**:913, 1949.
5. Pataro, V.: Aneurisma carotideo tratado con ligadura, Prensa med. Arg. **30**:2024, 1943.
6. Shea, P. C.; Glass, W. A., and Harland, A.: Anastomosis of Common and Internal Carotid Arteries Following Excision of Mycotic Aneurysm, Surgery **37**:829, 1955.
7. Spencer, F. C.: Aneurysm of the Common Carotid Artery Treated by Excision and Primary Anastomosis, Ann. Surg. **145**:254, 1957.
8. De Bakey, M.; Crawfoord, E. S.; Cooley, and Morris: Surgical Considerations of Occlusive Disease of Innominate, Carotid, Subclavian and Vertebral Arteries, Ann. Surg. **149**:690, 1959.
9. De Bakey, M., and Crawfoord, E. S.: Resection and Homograft Replacement of Innominate and Carotid Arteries with Use of Shunt to Maintain Circulation, Surg., Gynec. & Obst. **105**:129, 1957.
10. Pilcher, C., and Thurs, C.: Cerebral Blood Flow: III. Cerebral Effects of Occlusion of Common or Internal Carotid Arteries, Arch. Surg. **29**:1024, 1934.
11. Watson, W. L., and Silverstone, S. M.: Ligature of the Common Carotid Artery in Cancer of the Head and Neck, Ann. Surg. **109**:1, 1939.

BIBLIOGRAFIA

Brackett, C. E.: The Complications of Carotid Artery Ligation in the Neck, J. Neurosurg. **10**:91, 1953.

Dandy, W. E.: Results Following Bands and Ligatures on the Human Internal Carotid Artery, Ann. Surg. **123**:384, 1946.

Mahorner, H., and Spencer, R.: Shunt Grafts: A Method of Replacing Segments of the Aorta and Large Vessels Without Interrupting the Circulation, Ann. Surg. **139**:439, 1954.

Moore, O.; Oliver, M. F.; Baker, H. W., and Harvey, R. M.: Carotid Artery Ligation in Surgery of the Head and Neck, Cancer **8**:712, 1955.

Thompson, J. E., and Dale, J. A.: Surgical Management of Cervical Carotid Aneurysms, Arch. Surg. **74**:80, 1957.

The real America is not constituted by its great cities, but by its little towns, where the nation was forged. The inhabitants of rural areas are the tradition of this nation, just as country doctors once constituted the most dynamic force in its medical progress.

The country doctor is a sympathetic participant in the great emotional storms—economic and social—of his patients. This privileged role affords him an intimate view of his patients, which on occasions he has transmuted into the pure gold of literary creation.

More and more every day medicine becomes the art of promoting health, preventing disease, restoring health, and rehabilitating the invalid. In this great medical scheme the country doctor is established as the basic factor both in rural health centers and in health stations in factories and in industrial and residential districts. To achieve these goals, in the future, the rural health stations may lead to the district health stations, and hence to teaching hospitals. At the core of this system there looms that heroic infantryman of medicine, the country doctor, with whose help our profession will continue to reach new heights of dignity and grandeur.

—*Marti-Ibañez*

# Centros de Motricidad Pupilar en el Cerebro Visceral

## (Cerebral Centers of Pupillary Activation)

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*A study of the effects of electrical cerebral stimulation is reported. Applied to the external and caudal area of the anterior lobe it produces bilateral pupillary constriction. Stimulation of other areas results in mydriasis of varying degrees. The authors' results are correlated with those of other investigators.*

DE todos es conocido que la motricidad pupilar depende esencialmente de la inervación de los músculos constrictor y dilatador de la pupila. El primero de ellos se encuentra inervado casi exclusivamente por fibras colinérgicas que forman el tercer par craneano; en cambio, el segundo es de inervación adrenérgica y recibe sus fibras nerviosas del simpático cervical.

Los estímulos luminosos provocan el conocido reflejo a la luz; este reflejo está determinado en su primera parte o sea su vía aferente por el nervio óptico, el núcleo pregeniculado y el fascículo pregeniculomesencefálico. El arco reflejo se completa en su parte eferente con los núcleos pretectales y la porción anterior del núcleo de Edinger-Westphal que contribuye con fibras colinérgicas al ganglio ciliar y éste a su vez envía esta misma clase de fibras al músculo constrictor de la pupila a través de los nervios ciliares cortos.

El diámetro pupilar se encuentra, en condiciones fisiológicas, determinado fundamentalmente por la actividad o tono del núcleo pupiloconstrictor del tercer par. De aquí que puedan distinguirse dos clases de pupilodilataciones: una pasiva que resulta de la inhibición de la actividad tónica del núcleo pupiloconstrictor que se acaba de mencionar y la otra activa cuando se excitan las fibras simpáticas que inervan el músculo dilatador de la pupila.

Las fibras simpáticas que intervienen en la dilatación pupilar provienen del núcleo cilioespinal; esta estructura puede ser activada por núcleos de niveles superiores, particularmente por el hipotálamo lateral con el que está conectado a través del fascículo longitulinal dorsal.

Es interesante hacer notar que el diámetro pupilar puede variar por influencias nerviosas que provienen de niveles superiores a las antes mencionadas ya que existen conexiones anatómicas a través de las cuales van a ejercer su influencia, activación o inhibición, sobre el núcleo pupiloconstrictor o sobre las estructuras simpáticas centrales.

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Una estructura que influye provocando dilatación o constricción es el diencéfalo, posiblemente de manera directa sobre el núcleo constrictor de la pupila. Hess[1] ha estudiado entre otras reacciones autónomas las pupilares estimulando diferentes areas del diencéfalo. Sus resultados han sido publicados en su magnifica contribución neurológica: "Die Funktionelle Organisation des vegetativen Nervensystem." Hess utilizó el método de la implantación crónica de electrodos, en distintos sitios del encéfalo y logró estimular diferentes puntos del mismo; por medio de comprobaciones histológicas elaboró mapas de las regiones cuya estimulación provoca constricción o dilatación pupilar en el gato. Estas áreas se encuentran distribuídas en una zona comprendida entre la región preóptica, los núcleos anteriores y mediales del tálamo, los núcleos del techo y la substancia gris que rodea al acueducto del mesencéfalo, el subtálamo y el hipotálamo posterior.

Las zonas de miosis y de midriasis en ocasiones no están bien delimitadas ya que quedan entremezcladas en algunos sitios. No obstante puede distinguirse una distribución preferente de las mismas; es decir, la pupiloconstricción, por ejemplo, se obtiene por estimulación de áreas talámicas situadas más externamente que las que producen pupilodilatación e inversamente. En cuanto a su distribución en dirección ántero-posterior las zonas que provocan constricción se distribuyen con mayor frecuencia hacia adelante, mientras que las de dilatación hacia las regiones dorsales e inferiores. Hecho digno de mención es que entre las áreas que provocan miosis se encuentran las situadas alrededor de la comisura anterior, el hipotálamo anterior y las áreas circunvecinas a los núcleos supraópticos del hipotálamo.

La estimulación de algunas zonas de la corteza cerebral ocasiona cambios en la actividad de diversos efectores inervados por el sistema nervioso autónomo; entre éstos se encuentra la pupila, la que responde generalmente por midriasis y en ocasiones por miosis cuando se estimulan algunas zonas del cerebro visceral.[2] Pribram y MacLean[3] han denominado cerebro visceral a las estructuras cerebrales que tienen relación funcional con el sistema nervioso autónomo y la mayoría de las cuales se incluían anteriormente en el cerebro olfatorio o rinencéfalo.

La respuesta pupilar más frecuentemente observada al estimular la corteza cerebral como ya se dijo, es la pupilodilatación; ésta ha sido observada por Wang y col.,[4] Hodes y Magoun,[5] Gastaut,[6] Kaada[7] y Sachs, Brendler y Fulton[8] al excitar las estructuras límbicas, la amigdala del lóbulo temporal, la corteza frontal motora, etc.

Por otra parte, de todas las regiones exploradas se ha comunicado que solamente la activación de la región anterior del cíngulo en una porción limitada que se encuentra frente al genu del cuerpo calloso provoca pupiloconstricción.[5] Nosotros hemos encontrado algunas zonas que al ser estimuladas producen variaciones pupilares que previamente no habían sido señaladas y que son el objeto principal de esta comunicación.

*Metodos.* — Nuestros experimentos se realizaron en gatos anestesiadoos con nembutal por vía intravenosa a los que rutinariamente se les colocó una cánula traqueal con el objeto de dar respiración en caso necessario. La estimulación eléctrica de la corteza cerebral se efectuó por medio de un electrodo bipolar de plata-cloruro de plata, con una separación entre sus dos polos de dos mm. aproximada mente. Para estimular regiones muy pequeñas y de accesos difícil se empleó un electrodo bipolar concéntrico. Los electrodos fueron conectados a un estimulador

Grass S-4. Se utilizaron pulsos rectangulares con intensidad de 2 a 3 voltios, a una frecuencia de 50 a 60 por segundo y con una duración de un milisegundo.

La preparación del cíngulo derecho se realizó por medio de una craniectomía izquierda frontoparietal de dos centímetros de ancho y cuatro de largo a unos dos milímetros afuera de la línea media para respetar el seno longitudinal. Se retrajo lo más suavemente posible el hemisferio izquierdo, para dejar al descubierto la parte superior de la circunvolución del cíngulo (región límbica anterior). Con el objeto de descubrir la porción subcallosa del cíngulo se tuvo que realizar la succión de una porción del lóbulo frontal izquierdo que incluía la parte anterior de la circunvolución marginal la circunvolución sigmoidea posterior y anterior y parte de la circunvolución proreus. Se cubrió la preparación con vaselina líquida. La técnica empleada para estimular la corteza cerebral y la substancia perforada anterior fueron descritas en un trabajo previo.[9] Para el estudio de las variaciones pupilares se usó la observación, la fotografía y la cinematografía.

*Resultados.*—Se exploraron cuidadosamente todas las áreas del cerebro visceral y se confirmaron los resultados obtenidos por otros investigadores.

Como fué descrito en una comunicación anterior (Chavira y col.[9]), la estimulación eléctrica de la parte posterior y externa de la substancia perforada anterior en su confluencia con la banda diagonal de Broca produce instáneamente una constricción de la pupila en ambos ojos, franca y rápida que se mantiene todo el tiempo que dura la aplicación del estímulo (Fig. 1). Cuando se aumenta la intensidad de éste se observan movimientos de los ojos del lado estimulado, nistagmus y movimientos de convergencia en ambos ojos. La pupiloconstricción

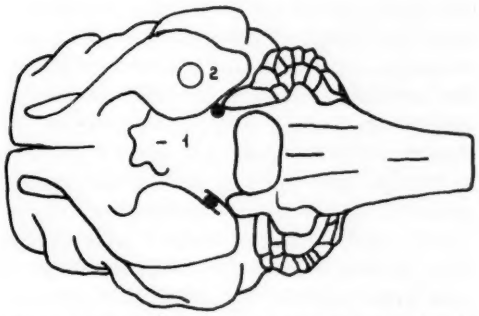



Fig. 1.—Cara inferior de cerebro de gato. 1, substancia perforada anterior; 2, lóbulo piriforme.

no requiere del quiasma y nervios ópticos ya que se obtiene aún con estas estructuras seccionadas; por otra parte, con los parámetros de estimulación empleados para producir la pupiloconstricción, la estimulación del quiasma y nervios ópticos no produce modificaciones pupilares similares a las descritas. El efecto descrito depende de la integridad del núcleo del tercer par o de sus conexiones con la corteza cerebral; ya que lesiones (sección rostral del mesencéfalo) que interrumpan estas conexiones corticomesencefálicas impiden la manifestación del efecto. La pupiloconstricción es independiente de las modificaciones de la presión arterial y de la respiración.

Hodes y Magoun[5] señalaron que en ciertos casos se obtiene una pupiloconstricción por estímulo en una pequeña área situada rostralmente al genu del cuerpo calloso en la circunvolución del cíngulo, hallazgo confirmado por Kaada.[7] Sin embargo nostros no hemos podido provocar pupiloconstricción excitando esa región.

Chavira y col. explorando toda la circunvolución del cíngulo han encontrado una zona cuya excitación produce una midriasis bilateral máxima, efecto que no había sido descrito previamente (Fig. 2). Esta área está colocada exactamente en la parte media e inferior del cíngulo

precisamente en su límite con la convexidad del cuerpo calloso. La midriasis obtenida es bilateral, franca y rápida. Se presenta con una latencia de uno a cuatro segundos; aumenta progresivamente hasta volverse casi total y persiste el tiempo que dura la excitación; el regreso a lo normal es progresivo. Ward, citado por Gastaut,[6] obtuvo una dilatación pupilar bilateral cuando se estimula una gran porción del área 24 del mono, más marcada cuando se estimula la porción superior del cíngulo y acompañada de una pérdida completa del tono muscular, con abolición del reflejo corneal y de todos los reflejos, de variaciones respiratorias, cordiovasculares y piloerección.

Explorando la circunvolución orbitaria encontramos la dilatación pupilar señalada por Sachs y col.;[8] la estimulación eléctrica de esta región produce movimientos oculares hacia el lado estimulado, lagrimeo, salivación y respuestas respiratorias y cardiovasculares. Estos investigadores señalan que la zona media y posterior de la orbitaria produce máximas midriasis. Nosotros hemos observado que existen también áreas de dilatación máxima colocadas en el tercio inferior de la orbitaria en su límite con la cintilla olfatoria (Fig. 3). En algunas experiencias la dilatación pupilar se acompañó de una alza discreta de la presión arterial, hecho no siempre constante. Sachs y col.[8] encontraron una midriasis considerable, mayor que la obtenida por estimulación de la orbitaria, cuando el estímulo se aplicó en la substancia perforada anterior; este hecho ha sido confirmado por nosotros que además hemos observado que la midriasis se acompaña de movimientos nistágmicos del ojo y de retracción de la membrana nictitante. Estas variaciones pupilares se acompañan de modificaciones de la presión arterial y de paro respiratorio.

Observamos también una dilatación pupilar bilateral estimulando la región cingular anterior (Fig. 2) hecho ya señalado por Smith, por Liebens y Woolsey, por Ward (citados por Gastaut[6]); la pupila del lado no excitado es mayor que la del excitado; la midriasis persistente disminuye diez minutos después de la terminación del estímulo. Se señaló una midriasis más o menos importante en un vasto territorio que responde al campo inhibitorio mediobasal de Kaada.[7]

Hemos obtenido también una dilatación pupilar bilateral y moderada cuando se estimula la región anterior de la circunvolución marginal, efecto que se presenta con diez segundos de latencia asociada a una contracción del orbicular del lado opuesto al estimulado (Fig. 3). En el área preóptica el estímulo produce pupilodilatación moderada lo mismo que en la parte dorsal del hipocampo (Fig. 2) y el lóbulo piriforme (Fig. 1; Chavira y col.).

La excitación del área frontal motora provoca midriasis ligera (Fig. 3).

## DISCUSION

Un hecho es indiscutible en el mecanismo de la motricidad pupilar y es el de que la pupiloconstricción es debida a la actividad del núcleo de Edinger Westphal. Las fibras pupiloconstrictoras tienen su primera sinapsis en el núcleo pretectal;

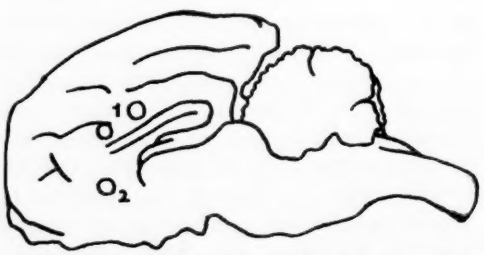



Fig. 2.—Cara interna de un hemisferio cerebral de gato. 1, circunvolución del cíngulo; 2, circunvolución del hipocampo.

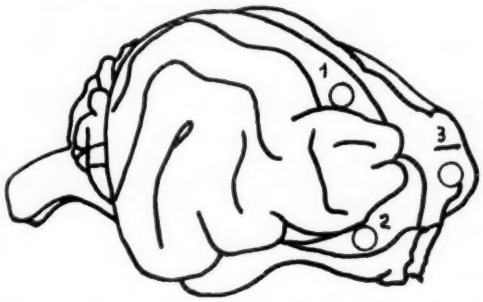



Fig. 3.—Cara externa de un hemisferio cerebral de gato. 1, circunvolución marginal; 2, circunvolución orbitaria; 3, circunvolución frontal.

la mayoría cruzan la comisura posterior del núcleo del motor ocular común del lado opuesto y otros pasan al núcleo del mismo lado. Del área cortical adyacente a la corteza visual las fibras constrictoras van al núcleo pretectal (Hare, Magoun y Ranson, citados por Clark[10]). Las vías periféricas del efecto pupilodilatador no son aún bien conocidas;[9] se supone que siguen la vía parasimpática del nervio motor ocular común bajo la forma evidente de una inhibición del núcleo del tercer par, porque la pupilodilatación se obtuvo aún después de la ablación del ganglio simpático cervical superior. Otros investigadores tienen una opinión ecléctica según la cual la pupilodilatación dependería a la vez de una excitación simpática y de una inhibición parasimpática.[6] Las vías centrales de este efecto pasan probablemente por el hipotálamo lateral y por la serie de áreas diencefálicas,[11] en donde se ha encontrado una gran representación de pupilodilatación y por el fascículo lateral y el longitudinal posterior llegan al núcleo cilioespinal.

Las vías de la pupiloconstricción que hemos obtenido por estímulo de una área limitada de la perforada anterior serán conocidas cuando se logre lesionar esta región con sobrevivencia del animal.

Decíamos[9] en un trabajo anterior que se puede emitir la hipótesis de que la substancia perforada anterior hace relevos en las estructuras hipotalámicas anteriores.

Recientemente Escobar[12] elucubra que los estímulos aplicados en el área de pupiloconstricción de la perforada pueden viajar por los sistemas rinales segundo y tercero a través de sus interconexiones o bien directamente al hipotálamo por el complejo amigdaloideo, o también a través de conexiones intercorticales hasta la corteza entorrinal y de allí pasando por la stría medullaris al tegmentum del mesencéfalo. Estas conexiones podrán comprobarse en futuras investigaciones.

## RESUMEN

El estímulo eléctrico en la parte externa y caudal de la substancia perforada anterior produce una reacción pupiloconstrictora bilateral.

Se produce midriasis bilateral máxima, por estímulo de la parte media e inferior del cíngulo, en su límite con la convexidad del cuerpo calloso y en el tercio inferior de la orbitaria en la vecindad de la cintilla olfatoria; midriasis no máximas por estímulo eléctrico en la región anterior de la marginal, en la sigmoidea anterior, en el área preóptica, hipocampo dorsal y en el lóbulo piriforme.

## REFERENCIAS

1. Hess, R. W.: Diencephalon. Autonomic and Extrapyramidal Functions. New York: Grune-Stratton, 1954, pp. 1-5.

2. Gloor, P.: Telencephalic Influences upon the Hypothalamus. Hypothalamic-Hypophyseal Interrelationships. Springfield, Ill.: Charles C Thomas, Publisher, 1956, pp. 74-113.

3. Pribram, K. y Kruger, L.: Functions of the Olfactory Brain, Ann. New York Acad. Sc. 58:109-138, 1954.

4. Wang, G. H.; Lu, T., y Ward Lau, T. T.: Pupillary Dilatation from Cortical Stimulation, Chinese J. Physiol. 6:225-236, 1938.

5. Hodes, R., y Magoun, H. W.: Pupillary and Other Responses from Stimulation of the Frontal Cortex and Basal Telencephalón of the Cat, J. Comp. Neurol. 76:461-473, 1942.

6. Gastaut, H.: Correlations entre le systéme

nerveux végétatif et le systéme de la vie de relation dans le rhinéncéphale, J. Physiol. Paris 44:431-470, 1952.

7. Kaada, B. R.: Electro-Corticographic Somato-Motor, and Autonomic Responses to Electrical Stimulation of Rhinencephalic and Other Structures in Primates, Cat and Dog, Acta physiol. Scand. 24:188, 1957.

8. Sachs, E. Jr.; Brendler, S. J., y Fulton, J.: The Orbital Gyri, Brain 72:227-240, 1940.

9. Chavira, R. A.; Beyer, F. C.; Anguiano, L. G., and Mena, J. F.: Constriction of the Pupil in Cat Elicited by Stimulation of the Anterior Perforated Substance, Bol. Inst. Estud. Méd. y Biol. México 18:87-89, 1960.

10. Clark, G.: The Visual Centres of the Brain and Their Connections, Physiol. Rev. 22:205-232, 1942.

11. Wang y col.[4] Chavira y col.[9]

12. Escobar, A.: Comentario al trabajo del Prof. Dr. Raúl Arturo Chavira y col. Depto. de Neuropatología C. U., México D.F., 1960.

Some surgeons grew callous to the shrieks and prayers and cries for mercy which filled their operating rooms, proceeding with a cold disregard for suffering and occasionally with a wholly unnecessary brutality. Some surgeons suffered tortures because of the necessity to torture others, and there is little doubt that the dread of inflicting pain kept out of the profession a certain type of sensitive intellectual and attracted a number of those who were psychologically unsound. Abernethy, successor to John Hunter, was so distressed by the need to cause pain that he vomited whenever he left the amphitheatre. Cheselden could not sleep the night before he had to operate. Charles Darwin abandoned his intentions of becoming a doctor after watching the horrors of two operations, one of them on a child. "The two cases fairly haunted me," he wrote, "for many a long year." And Dupuytren, the cold-blooded, opened a door from all this tragedy on a glimpse of the ludicrous. When he was about to operate on a woman, he made a remark to her which was so deliberately insulting that she fainted, whereupon he proceeded to operate—a solution to the problem of anesthesia which surely would not occur to any but a Frenchman.

Long before the middle of the nineteenth century the situation had become intolerable for patients and doctors alike. Mortality following operations was, conservatively stated, in the neighborhood of two in three, a considerable proportion of the deaths being attributable more or less directly to the effects of pain. Of those who survived the ordeal in the operating room, many had permanently undermined constitutions and psychic scars which would never be eradicated. Although some surgeons still repeated the dogma that pain is the inescapable will of the Almighty, surgery could in fact make no further important advance until some solution could be found to the problem of pain. Surgery had come face to face with the second great barrier to progress.

—*Young*

# Deutsche Abteilung

# Referat eines Vortrages über Cytostatica, gehalten auf dem International College of Surgeons in Rotterdam

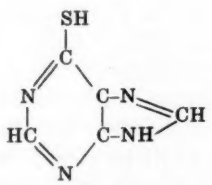
GERHARD DOMAGK, M.D.

WUPPERTAL, GERMANY

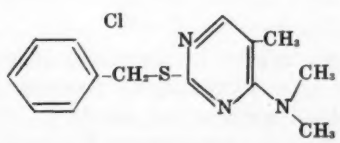
*The author discusses a number of cytostatic drugs and their use in attempted arrest of the growth of malignant neoplasms. Although it is still necessary to operate for carcinoma when chemotherapy alone is ineffective, the potentialities of the latter form of treatment must not be disregarded, as is clearly demonstrated by its recent spectacular results in the treatment of such conditions as thrombophlebitis, cerebral abscess and tuberculosis. Until the ideal method of carcinoma therapy is discovered, the degree of success depends upon judicious appraisal of the numerous measures available and, in the case of chemotherapy, careful selection of the drug to be employed.*

HÄNGT schon bei den Infektionskrankheiten—namentlich bei der Tbc—Entscheidendes von der richtigen Dosierung ab, wieviel mehr erst bei der Anwendung der Cytostatica, Unter Cytostatica verstehen wir heute allgemein Substanzen, die das Wachstum maligner Tumorzellen hemmen. Wir kennen heute 2 Gruppen von cytostatischen Substanzen. Erstens die sogenannten Anti-Metaboliten. Ihre Wirkung beruht darauf, dass Tumorzellen dieselben—wie Bakterien Sulfonamide anstelle eines lebensnotwendigen Stoffes—einbauen, da Tumorzellen ihrerseits einen grösseren Bedarf an Bausteinen der Nukleinsäuren notwendig haben und auch falsche, den physiologischen nur ähnliche, einbauen. Durch den Einbau solcher falschen Bausteine, z.B.

*6-Mercaptopurin*




oder *"Bayer DG 428"*—ein Thyminderivat—




wird das Wachstum der Tumorzellen gehemmt, und zwar nicht nur im Experi-

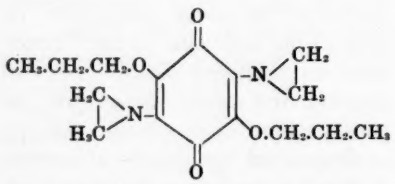
Submitted for publication March 17, 1961.

ment, sondern auch beim Menschen. Z.B. hilft "Bayer DG 428" nach K. Boshamer sowie den Erfahrungen der Kieler Univ.-Klinik, der Urolog. Klinik von Prof. Hölzel, ferner nach Prof. Ravina, Paris, u.a. bei Blasenpapillomen und manchmal sogar bei schon fortgeschrittenen Blasencarcinomen, des weiteren nach bisherigen Einzelbeobachtungen auch bei Darm-Tumoren. Diese Substanz ist harmlos und verursacht keine Nebenwirkungen bei einer schon Tumor-wirksamen Dosis von tägl. 3 x 20 mg; aber auch 100-120 mg/kg können zeitweilig verabreicht werden.

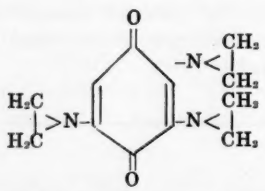
Unvergleichlich wirksamer als diese bei richtiger Dosierung völlig harmlosen Substanzen—ohne Nebenwirkungen auf das weisse und rote Blutbild—sind die sogenannten alkylierenden Substanzen:

a) *Lostderivate* wie Sinalost
Mitomen
Endoxan
u.a.

b) *Aethylenimine,* besonders die von Petersen u. Gauss sythetisierten *Aethyleniminobenzochinone wie "Bayer E 39"*



und das *Trenimon* (= "Bayer 3231")



Diese stark wirksamen Substanzen verlangen eine sorgfältigste Dosierung, die individuell auch etwas variiert. Sie erfordern eine sorgfältige Kontrolle des weissen Blutbildes, das bei etwa 4,000 Leukozyten gehalten werden soll. Die Wirkung des "Trenimon" auf menschliche Tumorzellen ist so gross, dass z.B. Hela-Zellen-in Gewebskultur gezüchtete Zellen eines menschlichen Portio-Carcinoms auch durch eine Verdünnung 1:1 Milliarde zerstört werden.

Es ist also durchaus vorstellbar, dass selbst ein grosser Tumor schon bei nur stundenweiser Einwirkung so hoher Verdünnungen völlig zugrunde geht, wie es bei lokaler Anwendung auch beim Menschen von H. Knaus, Wien, beschrieben worden ist (Krebsarzt 1961, Heft 10, S. 414). Ob bei i.v. oder oraler Verabreichung allerdings in allen Tumorzellen diese Konzentrationen erzielt werden können, ist fraglich. Aber auch bei i.v. und oraler Behandlung hat H.-J. Wolf, Bielefeld, mit kleinen Dosen von 1-2 x 1 mg wöchentlich schon bemerkenswerte Ergebnisse bei langfristiger Behandlung ohne Blutbildschädigungen berichtet. Bei lokaler Umspritzung hingegen und Infiltrierung eines Tumors können wir diesen Effect, wie A. Pillat an malignen Lid- und Konjunktival-Tumoren gezeigt hat, fraglos auch schon mit "Bayer E 39" erreichen.* Wozu aber eine neue Lokalbehandlungsmethode—ausser Operation und Bestrahlung? Bei den Lid-Tumoren hat nach A. Pillat die Injektionsbehandlung mit Bayer E 39 bessere kosmetische Ergebnisse gezeigt als durch Operation, besonders bei den Lidwinkel-Tumoren. Bei operablen und inoperablen Portio-Carcinomen fand H. Knaus, von Bleier nach der Umspritzung und Infiltration—entsprechend der Methode von A. Pillat—nach "Trenimon" —Injektion später keine Tumorzellen mehr. Auch andere Tumoren, die äusserlich zugänglich sind, lassen sich fraglos mit entsprechenden, lokalen Umspritzungen und Infiltrierungen behandeln. Die Umspritzung vor der Infiltrierung des zentralen Tumors scheint wichtig, um eine Ausschwemmung von Tumorzellen zu ver-

*A. Pillat: Vortrag der 10. wereslunpafbl. Arbetagung. Nurnberg, Verlag Enke Stuttgart.

hüten. Vorteil dieser Methoden scheint zu sein, dass bei Infiltration auch Tumorzellen in der weiteren Umgebung zugrunde gehen, worauf A. Pillat immer wieder mit besonderem Nachdruck hingewiesen hat; denn es geht mehr Gewebe zugrunde, als sicher als Tumor makroskopisch zu erkennen ist. Die Erfolge von A. Pillat an bösartigen Tumoren des Augenlides und der Konjunktiva sind ja inzwischen von den Universitäts-Kliniken Erlangen, Hamburg und anderen bestätigt worden.

Macht man hingegen nach einer Operation—ohne cytostatische Vorbehandlung—einen Abstrich aus dem Wundbett, werden häufig noch Tumorzellen nachgewiesen. Jeder Operateur kann sich leicht selbst davon überzeugen. Prof. Dr. Herrmann, Direktor der Univ.-Hals-Nasen-Ohren-Klinik in München, hat das in objektiver Weise getan—und sich überzeugt. Ausserdem aber hat er in Zusammenarbeit mit Dr. F. Graeber, der die Methoden des Nachweises von Tumorzellen im Blut verbessert hat, auch schon Tumorzellen im Blut nachgewiesen, selbst bei kleinsten bösartigen Tumoren des Hals-Nasen-Rachenraumes. Aber nicht nur das; bei jeder Operation werden Tumorzellen infolge Quetschung und Verlagerung des Tumors auch noch vermehrt ins Blut und in die Lymphbahnen eingepresst und wird so die Metastasenbildung gefördert. Die Untersuchungen von T. R. Asworth, F. W. Zahn, Aschoff und Papanicolaou wiesen zuerst auf diese Tatsache hin; neuere Untersucher stellten fest, dass mindestens bei 50% aller Tumoren Tumorzellen im Blut nachweisbar sind. Was aber wollen wir dann noch von alleinigen Lokalbehandlungsmethoden erwarten, wenn Tumorzellen selbst bei kleinsten, kaum diagnostizierbaren Tumoren schon im Blut sind? Die myeloische und lymphatische Leukämie scheinen nur Sonderfälle mit besonders vielen Tumorzellen im Blut zu sein—grundsätzlich scheinen Tumorzellen jedoch zeitweilig bei jedem Tumorpatienten im Blut aufzutreten—und müssten zerstört werden. So bietet sich die Leukämie als hervorragender Test an, ob es überhaupt Cytostatica gibt, die Tumorzellen im Blut zerstören. Für den Patienten ist das Wichtigste allerdings nicht nur die Zerstörung der Tumorzellen im Blut, sondern vor allem ein längeres Leben unter erträglichen Bedingungen. Beides soll nach den bisherigen Erfahrungen mit "Trenimon" zum ersten Male gelingen, und zwar nach den grossen Erfahrungen von A. Linke mit kleinsten Dosen von 0.5-1 mg. tägl. oder gar nur 1-2 x 1 mg. wöchentlich. Die Arbeiten von Linke, Meythaler und anderen sind in dem von Meythaler herausgegebenen Buch "Chemotherapeutische Probleme maligner Tumoren" im Ferdinand Enke-Verlag, Stuttgart, veröffentlicht. Es muss die verschiedene Dosierung bei verschiedenen Tumoren berücksichtigt werden. K. Boshamer gelang es, durch Verabreichung von 2 x 10 mg "Bayer E 39" tägl. in Cognac bei inoperablen Magen-Ca-Patienten die Lebenszeit nach Stellung der Diagnose zu verlängern, worüber Herr Professor Boshamer selbst berichten wird. Eine bemerkenswerte Lebensverlängerung konnte Professor Stoetter, Augsburg, durch alleinige Behandlung mit "Bayer E 39 solubile" und "Bayer DG 428" erreichen. Adelberger erreicht durch Verabreichung von "Bayer E 39" resp. "Trenimon" an Patienten, die bei der Probethorakotomie ein inoperables Lungen-Carcinom hatten, dass nach einem Jahr noch doppelt so viele Patienten lebten als ohne cytostatische Behandlung. Das ist sicher noch nicht die optimale Behandlung. Wenn dieses Ergebnis aber schon bei einem ersten Anlauf zu erzielen ist, ist das sehr bemerkenswert.

Müssen wir nicht überhaupt unsere Anschauungen über Krebs und andere bösartige Tumoren ändern? Wenn es sich bestätigt, dass Tumorzellen auch bei klein-

sten Tumoren oft schon im Blut sind, kann die lokale Zerstörung des Tumors durch Strahlen oder operative Entfernung des Primärtumors allein doch keine Heilung mehr bringen—nicht allein! Dann müssen wir dem Körper Substanzen zuführen, die die Teilungen der Tumorzellen, die schon im ganzen Körper verstreut sind, verhindern, zumindest so bremsen, dass sie sich nicht mehr rascher teilen, als Tumorzellen zugrunde gehen; erst dann wird ein physiologisches Gleichgewicht erreicht. Es scheint möglich zu sein bei manchen Patienten, z.B. durch Gaben von 2 x 5 mg "Bayer E 39" per os.—Wolf, Kretz u.a. berichteten von Patienten, die sie durch kleine Cytostatica-Gaben noch bemerkenswert lange am Leben erhalten konnten. Primarius Dr. Johannes Kretz, Wien, teilte folgenden Bericht über einen Patienten mit inoperablen Lungen-Carcinomen mit: 2 x 5 mg "Bayer E 39" per os ermöglichten es dem Patienten, noch 2 Jahre an hervorragendster Stelle in seinem Orchester mitzuwirken. Über die Wirkungsweise von "Trenimon" auf Tumorzellen und den Stoffwechsel der Tumorzellen haben R. Bierling (Therap. Berichte 1960, Heft 5) und J. Pütter (Zeitschrift für Krebsforschung, 1961) berichtet.

Wir müssen—glaube ich—diesen neuen Weg gehen, wenn wir bei der so hoffnungslosen Therapie der malignen Tumoren mit bestenfalls 20-30% Erfolgen endlich auch zu einer mehr kausalen Behandlung kommen wollen. Früher haben wir Lippenfurunkel inzidiert und bekamen eine Thrombophlebitis und Hirnabszesse; früher wurde eingreifende Operationen in tuberkulös infizierten Geweben und Organen durchgeführt. Heute wird nur noch operiert, wenn die Chemotherapie alleine nicht ausreicht. Sollte dies' nicht auch der logisch anzustrebende Weg bei der Tumorbehandlung sein? Noch wissen wir nicht, ob wir die optimal wirksamen Cytostatica schon in der Hand haben und ob wir nicht nur noch lernen müssen, sie richtig zu handhaben, z.B. wielange wir sie zweckmässig vor Operationen anwenden müssen, wie lange nachher, ob besser lokal oder parenteral oder per os. Bisher haben die lokalen Behandlungsmethoden die eindeutigsten Erfolge gezeigt. Auch hier sind noch viele Variationen in der Behandlung denkbar, bis die optimale Anwendungsmethode gefunden ist. Wir werden abwarten müssen

1.) welche der Behandlungsmethoden bei Tumoren die besten sein werden,

2.) welche Substanzen die wirksamsten sind.

Wir müssen ganz neutral, ganz unvoreingenommen und ganz sachlich nur das Interesse des Patienten wahrnehmen auch an die Wertung dieser neuen therapeutischen Möglichkeiten herangehen. Jeder Arzt kann dazu seinen Beitrag leisten.

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One of the persistent delusions of mankind is that some sections of the human race are morally better or worse than others. This belief has many different forms, none of which has any rational basis.

—*Russell*

# *Editorials*

## A National Emergency: Ways of Meeting the Physician Shortage*

### I. The Nature of the Problem

RALPH R. COFFEY, F.A.C.S., F.I.C.S., D.A.B.

KANSAS CITY, MISSOURI

WE HAVE met here today to discuss the shortage of physicians in the United States, both that which exists today and the even more marked shortage possible in the future if steps are not taken to remedy the present system of medical education.

None of us is here simply to explore the defects and offer carping criticism. Rather, we hope to determine, with the help of our distinguished panel members, the possible solutions to the problem.

We expect to initiate some constructive suggestions that may help our educators, in the words of MacCahal of the American Academy of General Practice, "to see the forest in spite of the trees."

The practice of medicine has changed over the years, not so much from internal as from external pressures. The profession has lost some of its prestige with the public owing to the many attacks that have been made upon its integrity, both individually and collectively. Medical services to the public have been belittled, and the profession's resistance to persistent political attacks upon the present structure of medical care has been labeled by politicians "self-seeking."

The profession has fallen also from its favored position among our youth because of the persistent threat of nationalization placed upon it by those who act with selfish political motives. Our own restrictions and specialty accreditations have made medical education so prolonged, complex and expensive that it no longer attracts a large number of young persons to its ranks.

It is absurd to talk of building more medical schools when at present there are 665 vacancies in budgeted professional positions in the schools we have already.

The real problem is that of recruitment of students to medical schools and more efficient utilization of current facilities and medical teachers, both full and part time.

At present, in our medical schools, there are 54,270 full-time and part-time teachers, and 30,203 students are enrolled. In dental schools there are 4,500 teachers and 14,800 students. Why should there be such a disproportion—nearly 2 teachers to 1 student—in medical education? Other participants may have more to say on this point.

*Symposium presented at the Twenty-Sixth Annual Congress of the North American Federation, International College of Surgeons, Chicago, May 14-18, 1961.

As is well known, many members of the College have been deeply concerned about the present educational system in medicine. Thus far it has failed, through the methods currently in use, to produce an adequate number of men and women to fulfil our obligations to the public for full medical care. The ratio of medically trained personnel to the lay population is shrinking.

There are approximately 250,000 physicians and osteopaths in the United States. This includes physicians who are retired or engaged in pursuits not directly related to the day-by-day care of the ill.

The frequently cited ratio of 140 physicians per 100,000 of population is not factual as related to the care of the ill. Actually, in 1959, it was closer to 91 practicing physicians per 100,000 of population. This was a decrease from the ratio similarly arrived at in 1940—108 practicing physicians per 100,000 of population.

It is true that research and new methods have allowed practicing physicians to absorb and carry the increased load, but there is a limit, and we are rapidly approaching it.

If one accepts the more optimistic figure of 140 physicians per 100,000 of population as today's proportion and projects it into the future, with our present graduating classes of 7,800 from medical schools in the United States and with the expected increase in population, we shall have a ratio in 1975 of 133 physicians per 100,000 of population. The shift since 1931 is interesting.

The following statistics are quoted from the Report of the Surgeon General Consultant Group, published in October of 1959.

*Proportion of Physicians to the Total Population of 100,000*

| | *1931* | *1959* |
|---|---|---|
| Total physicians | 126 | 133 |
| Private practice | 108.2 | 90.7 |
| General practice & part specialty | 90.3 | 46.3 |
| Full specialty | 17.9 | 44.4 |
| Not in private practice | 13.0 | 36.8 |
| Hospital services | 7.8 | 22.4 |
| Teaching & research | 2.3 | 4.5 |
| Federal government | 2.9 | 9.9 |
| Retired | 4.8 | 5.8 |

Even more disturbing to those studying the problem of assuring the public of adequate or improved medical care in the future is the failure to recruit adequate numbers of students for enrollment in medical school. This concern also applies to the paramedical fields of nursing and medical technology.

In this year, 1961, the ratio of applicants for medical school for places available has shrunk to 1.1 applicants for one place. This figure shows that the medical schools have a decreasing selectivity.

The ratio of *A* students among the applicants has shrunk. The predominant grade classification of applicants is now *B* with a liberal sprinkling of *C*'s.

This is not really catastrophic in itself, for many *B* and *C* students will, in medical school, find themselves and become good practical physicians. They will do the job for which medical schools admit them, i.e., learn how to give good, conscientious, basic medical care to sick people. They may not develop into distinguished scientists and teachers, but they can, if they have the desire to serve, give fine medical care.

A study group has outlined the causes for the failure in recruitment as follows:

1. The long period of time required for medical education is discouraging.

2. The cost of this education, figured in actual outlay and in loss of possible income during the prolonged educational period, is extremely high.

3. The continued threat of nationalization or socialization of medicine is a factor.

4. The emphasis on specialization and the lack of opportunity to advance from general practice to specialty training once a person enters practice has had an effect.

5. There is a national hysteria concerning security, more pay, shorter hours, a five-day week, an eight-hour day, vacations with pay, retirement pay, and other fringe benefits offered by industry.

6. The irritation often expressed by the doctors themselves because of increasing regulations in regard to medical practice, hospital appointments, privileges and accreditation demands which would naturally discourage a newcomer.

7. The continued downgrading of the profession in the eyes of the public by news reports and government agency attacks by innuendo has taken its toll.

8. There is other unfavorable publicity in regard to health services, such as the attacks on the credibility and honesty of the pharmaceutical houses and the hospital charges, which have skyrocketed since 1950 owing to administrative expansion and necessary wage increases to maintain services in this field. There is a continued inference that all objections to government-controlled medicine by the American Medical Association and by doctors are evidence of self-seeking, inspired only by the profit motive.

There are solutions to these problems, and the panel will deal with the various factors frankly and offer suggestions that should lead to a constructive program. Public attention should be called to the fact that the medical profession wants and urges such changes as will give the public better medical care in the years to come.

Immediate measures are needed to attract students in greatly augmented numbers.

The students and the public must be assured that the competitive effort which accompanies an increase in the number of young doctors will be welcomed, that the members of the medical profession will be happy to aid in their training, and that the doctors will help the medical schools now operating to improve their methods and accelerate their progress in education.

In my opinion, the nurses at large and the medical technologists will share the desire for a more highly competitive era. With greater numbers of skilled people in these fields, we can offer better care to the ill.

For three years the Regents of the International College of Surgeons have considered whether it is desirable that this organization, as a group of public-spirited surgeons, should speak out concerning the numerical deficiency of trained medical personnel. Many physicians have felt that if they remain mute until an actual emergency is at hand, the public can justly blame them for not having given sufficient warning. Certainly doctors are in the best position to be informed of the dangers confronting the care of the people's health.

Two years ago Dr. Edward Compere, as president of the United States Section of the International College of Surgeons, appointed a committee to study the situation and report their observations to the Regents. This committee has continued its work under the supervision of the current president, Dr. Gershom Thompson. The Regents have discussed the matter from many angles at both regional and national meetings, and the panel discussion today is the result of their decision, which is supported by the action of the Executive Council, to give publicity to the problem. This is the action of a deeply concerned medical group, who intend not to be contentious or critical but to place any information they possess before the general public, which certainly has a right to full knowledge of the emergency.

The possible solutions open to us are as follows:

1. The outlay of time and money necessary to obtain a medical education should be reduced. Loans and endowments, not Government subsidies, should be made available.

2. Medical education should be accele-

rated by running all the schools twelve months a year. The medical curricula should be revised, with more emphasis placed on the basic sciences and clinical work, and research should be introduced at the postgraduate level.

3. The educational period should be shortened to three years of medical school and one year of internship, and/or the premedical educational period should be shortened by allotting some of the basic science subjects to premedical training.

4. Postgraduate procedures should be reviewed and revised so that a physician who has been in private practice as a general practitioner for several years may have an equal opportunity (as a man in business and industry has) to improve upon his talents and specialize if he so desires.

5. The attacks on the honesty and abilities of the medical profession as a whole should be reviewed and acted upon, with recognition of the fact that some members of the profession, like some men and women in any walk of life, may need special surveillance.

6. The right of physicians to speak with dignity about national health measures and their equal right to be heard with respect should be declared, for about those subjects they should have and do have special training and knowledge.

7. Physicians should not stand mute any longer, and thus appear to agree tacitly that what is happening as a result of current ideas of medical education and medical care is proper.

8. It would possibly stimulate interest in the medical and nursing professions if more health fairs, such as those presented in New York, Dallas and Kansas City, were organized and presented in various parts of the country. Young people may respond to proper and honest dramatization of the part played by doctors, nurses and medical technologists in the daily life of the people.

## II. The Profession and Its Critics

PHIL COGLEY, M.D., F.A.C.S., F.I.C.S.*
COUNCIL BLUFFS, IOWA

WHEN this title was first suggested to me, several questions immediately arose in my mind: Is this an emergency? Is it alarming? Is it relative, or does a shortage actually exist? I am sure that, after you have given thought to some of the figures I shall present, you will fully agree that this emergency is not relative, as has been suggested by some, nor is it due to an "explosive" population or the utilization of a greater number of physicians by the armed forces, industry, corporations or insurance companies.

Please bear in mind that the population of the United States increased from 149,000,000 in 1949 to 179,000,000 in 1959-1960. It is sad to relate that, during this same period, the number of qualified applicants for medical schools decreased from 25,000 in 1949 to 15,000 in 1959-1960—an actual decrease of 37 per cent. This decrease has continued, so that we find the ratio of applicants to medical schools for September 1961 to be 1.8 to 1—an all-time low. This is more discouraging, as there are certain factors that might be expected to increase the number of potential applicants (college graduates) and expansion

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of the medical schools (20 per cent more first-year places). With these facts in mind, it can be stated unequivocally that we face an actual, serious and alarming emergency, the causes of which are not quite clear.

I should like to divide my observations on this subject into two categories—(1) the causes and (2) the cures. The title of this paper suggests that a theory for a cure is to be advanced. To me this is impossible without first analyzing the causes.

1. The cost of medical education, especially as compared with that of other scientific disciplines, is discouraging to the student. I put this in first place, not because I feel that it is of paramount significance, but certainly when this subject is discussed with lay people it is likely to be considered the all-important factor. Actually, in my own relatively extensive survey, I should estimate it, as a causal factor, at about 35 per cent.

Not everyone is entirely familiar with the enormous cost of medical education as compared with, for example, engineering, an increasingly growing field. Tuition for the private schools with which I am familiar (and 50 per cent of our medical schools are private) ranges from $1,100 to $1,500. Most of these schools are having financial difficulties, and further increases are inevitable. Tuition for state schools is less. Resident students pay, on the average, $500, and nonresidents about $800. There are few scholarships available in medicine and the humanities. This is not the case in most of the sciences.

Two of my medical students worked out an interesting comparison between two boys who, having just finished high school, embarked on their careers, one in medicine, the other in engineering. They attended private institutions in the same area. The boy in medicine spent four years in college, four years in medical school, one year as an intern and four years as a specialty resident. The boy in engineering finished his four-year course and accepted a position in industry at a salary of $6,500 per annum with annual increases. The differential—by the time our medical specialist started to produce—was determined by one student to be $69,000, and the other student arrived at a figure of $74,000.

There are several pertinent factors that should be mentioned at this point. Most deans, with good cause, have forbidden or strongly discouraged their medical students from engaging in outside employment during their medical course. Also, it may be noted that two of the student's three summer vacations are utilized in hospital clerkships or dispensary assignments. There is also some importance in the fact that 67 per cent of the physicians are specialists. Two other important factors are that 71 per cent of our medical students are married, and that 82 per cent of the cost of a medical education is provided by the student and/or his family.

2. The time spent in getting a medical education is too long. Upon interviewing several boys who are still in medical school and several who switched during their premedical years, I discovered that the time spent was a factor. Their reasoning was that there was too much delay in being able to marry and have a family and a still further delay in obtaining economic security.

3. Many students are discouraged by fear of socialized medicine. I was quite surprised to discover during my interview with boys who had seriously considered medicine and then decided against it, that this fear had influenced a considerable number of them. I was further surprised, in speaking to doctors with sons considering the medical profession, to find that they had not only called their own sons' attention to this threat but had spoken of it to other boys who had sought their advice. One doctor's son remarked to me, "Dad has already given up on the fight

against socialized medicine. He is ready to accept it. I feel I want no part of it."

4. The physician has lost and is losing prestige. I am fully aware that here I am treading on dangerous ground. Please bear in mind that my statements are not an attempt to "pass judgment." I am reporting the results of a personal survey of medical students, interns, residents, physicians in practice, scientists in other fields and a very few lay people. These interviews were exhaustive and consumed many months.

Whether we like it or not, and whether we like to hear it or not, we must face the fact that there has been a down-grading of the practice of medicine by the public, the press, science teachers in high schools and colleges, student counselors and even physicians themselves. This, of course, has a tendency to destroy motivation in interested students. I am informed by reliable authorities that this situation is much worse in those countries which have socialized medicine. This, of course, is cold comfort.

Formerly, the public revered, even idolized, the physician, and the press eulogized him. Perhaps now both are aware that the practicing physician has not been the one to discover the causes of disease and produce the efficacious agents to combat them. He is often—though erroneously, I am sure—described as if he were a technical agent for a pharmaceutical house.

Many young men capable of dedication to an ideal, who have a definite interest in medicine, upon entering college or even during the last years in high school, may receive no further encouragement or may actually be discouraged from further consideration of medicine by an uninformed, indifferent or even hostile student counselor. Rightly or wrongly, medical men are accused of "looking down" on their scientific colleagues and holding themselves above Ph.D.'s, who "could not make" a medical school, and of setting up tight unions, such as the A.M.A. and the specialty boards, against them.

Have physicians themselves been in part responsible for this alleged loss of prestige? Whatever the reason, the physician has lost, in recent years, some of his social status and former prestige. I am sure that the words of Robert Louis Stevenson, though true when written, may not be true today, "There are men and classes of men that stand above the common herd—the physician almost as a rule." These factors, I am told by physicians who are fathers and by other parents, have influenced them to discourage their progeny from pursuing medicine as a career.

Two older physicians, with whom I discussed this subject recently, were both of the opinion that this situation began during the early part of World War I, when there was an acute shortage of doctors and those who were available were overworked, fatigued and quick-tempered. They were accused of many faults, but were especially castigated for their refusal to make house calls when, as a matter of fact, they were unable to tear themselves away from the hundreds of patients who swarmed into offices, emergency rooms and outpatient departments of the hospitals. A few of these were, perhaps, not seriously ill, but I am told that many of them were.

Again, rightly or wrongly, physicians are accused of having an apparent disregard for science in medicine. An alleged vulgar display of wealth is also a cause of resentment. As a corollary of this, the high cost of medical care is, in its entirety, blamed upon the physician, without thought of the enormous increases in hospital and drug costs. Physicians are also charged with being too independent, keeping patients waiting needlessly and making no attempt to establish good public relations. All of these accusations—cor-

rect or not—surely call for an individual examination of conscience.

5. There are greater economic advantages to be gained in other fields of endeavor. I have discussed this at great length with students, both premedical and medical, and with interns and residents. They have spoken of the advantages associated with employment in the sciences and industry. Many of their arguments concern points already discussed: lower educational cost, fewer obligations, less indebtedness and less time consumed. They call attention to other quite obvious advantages, such as a forty-hour work week, paid vacations and sick leave, social security and pension and insurance plans. Also the private teaching of medicine is not as lucrative as it was in former years. Teaching fellowships and scholarships in the physical and biologic sciences are available in amounts ranging from $1,800 to $3,600.

These are some of the causes. Is there a cure? Although I have had considerable opportunity to study and survey the causes, I have had less opportunity to evaluate proposals for a cure that have been advanced and advocated. As in so many other situations in life, it is very easy for the partially informed person to suggest a panacea that will not work in practice or will, at least, have many disadvantages and even dire consequences.

The cure, of course, was the subject proposed for this discussion. I repeat, however, that without a full appreciation of at least some of the more commonly advanced reasons for the shortage, any attempt to apply therapy would be fruitless. I shall attempt very briefly to enumerate some of the recommendations that have been made by various groups for the correction of the problem. I do not consider myself completely competent to pass on the individual merits of these suggestions.

1. It should be the responsibility of each and every physician to perpetuate his medical heritage by assuring himself that there are available an adequate number of excellent candidates for entrance into medical schools. If each physician in the United States, once every four years, were able to influence one outstanding young man to become interested in medicine, our problem would be greatly lessened.

2. The establishment of better public relations at all levels—individual, county, state and national—is of great importance. This would give the physician an opportunity to regain some of his lost prestige.

3. Recruitment at all these levels, with the utilization of all media of communication, such as the public forum, television and radio, is also important.

4. It is imperative that there be a correction of the misunderstanding existing between medical men and their colleagues in the sciences at both high school and college levels, with the end in view of establishing better relations between them. This should be followed by diplomatic and polite indoctrination of our fellow-scientists with the truth about the more worthwhile attributes of medical practice.

5. The setting up of more premedical committees (many are in operation now) by individual medical schools or by the American Association of Medical Colleges would be invaluable. Their purpose would be to meet with interested students and inform them of the pertinent facts regarding (a) life in a medical school; (b) possibilities for graduate education and research; (c) total cost; (d) living facilities; (e) the problem of marriage; (f) internships and residencies; (g) outside remunerative occupations and their advisability, and (h) spiritual and material gains.

6. Shortening of the curriculum, which should not be confused with the accelerated program, could be considered. I have been informed by authoritative sources that this is already being tried in

four or more schools; I am of the opinion that insufficient time has elapsed to form any opinion of the results. Incidentally, when I discussed this with nine seniors to be graduated in 1961 (and these were all boys who, with blood, sweat and tears and with little or no outside help had put themselves through medical school), seven of them stated that they were not in favor of any shortening of the course. They felt that they had needed the time for "growing up." Three told me that it was not until their junior year in medicine that they realized "what it was all about."

7. Every method should be used to lessen the financial burden. The possibilities are as follows:

a. Loans by individuals are possible. Many physicians and others have, through the years, made loans to young men in whom they were interested. Loans from state medical societies, industry, foundations and the Government are available. Many fine boys may oppose this, being reluctant to take on the additional responsibility of a debt that may take them years to pay.

b. Gifts, mostly from individual persons or a few foundations, can be utilized.

c. Bills are in Congress at this time to provide scholarship funds for both the student and the schools. I have been informed that as these bills are now written there are no "strings." They may be rewritten.

d. Grants are generally of three types: training grants to good students or residents, teaching grants (such as the Cancer and Heart Fund grants) and project research grants, which some schools are now receiving. Almost all of these are contractual.

e. More fellowships for undergraduate research should be made available.

f. Hospitals may reasonably be expected to carry part of the load by increasing the wages of interns and residents.

Deans and heads of schools with whom I have spoken are in complete agreement in their opposition to government aid, which would eventually lead to subsidy of the school.

It may be noted that, since this paper was written, the A.M.A. has announced the setting up of a fund of $12,500,000 earmarked for student loans at bank rates to be disbursed by the deans, I believe on the basis of need. At about the same time, the student A.M.A. announced that their house of delegates had gone on record as opposing government scholarship but favoring government loans.

In this brief presentation, I have attempted to show that a serious and alarming national emergency, the shortage of physicians, does exist and is continuing. Some of the causes revealed by my survey have been briefly enumerated, and attention has been called to a few of the remedies advocated, none of which seems to be completely satisfactory or universally acceptable.

## III. The Family Doctor

JOHN S. De TAR, M.D.
MILAN, MICHIGAN

THE aggressively ultramodern among my colleagues may be of the opinion that I enter this discussion with three strikes against me: (1) I left medical school some thirty-odd years ago; (2) I am not a medical educator, and (3) I am a general practitioner and a country doctor.

I shall therefore make no attempt to cover the whole field, but shall confine my

comments to the field in which I practice, and about which I have learned something —the general practice of medicine.

This field poses for the profession the most pressing problem on the medical horizon. The question to be decided by the profession and by its educators is just this: Is family practice as we have known it for the past two generations a dying institution, or will it survive? The present situation is actually as serious as that. There are in the United States today more specialists than general practitioners, and the trend is increasing rather than decreasing. During the past thirty years, the number of specialists has increased by 350 per cent, and the number of general practitioners has decreased by 30 per cent, in spite of an annual increase of 30 per cent in the total number of physicians.

When Dr. Osler Peterson of Harvard University Medical School told me of the high quality of his junior class of about a hundred students, I asked him how many were choosing general practice. His reply was, "I think there is one."

Dean William Hubbard of the University of Michigan Medical School, who has interviewed more than 1,000 medical students, one at a time, during the past ten years, had this to say about family practice:

"There are a fairly large number of students who do not want to limit their professional activities to any particular field, but are disturbed at the prospect of trying to be responsible for the full range of medical problems that might come to them. I believe that it is this concern with being able to give quality medical care without clear limits on the range of responsibility for definitive therapy that takes many students away from a consideration of family practice." In my opinion, Dean Hubbard hit the nail right on the head.

The demise of general practice as we know it today is a real threat, despite the obvious virility of the American Academy of General Practice, which has 27,000 members, a continuous educational program and an active campaign for sponsoring the family physician. The signs are ominous. Despite the recognized necessity for graduate training of more than one year, there are today ten residents in training in internal medicine to every one in general practice.

The question is whether general practice is dying a natural death at the hands of specialization or whether our educational system, our internship and residency programs and our hospital staff policies are such that young physicians, purposely or not purposely, are steered into the specialties.

There is no question as to the people's desire. They want a family doctor. Too many communities have a plethora of general surgeons and internists and a dearth of family physicians. Too many patients, as a direct result of being shunted from one specialist to another, with no one doctor acting as the captain of the diagnostic and therapeutic team, are crying for a competent family doctor. Both the American Medical Association and the American Academy of General Practice recognize the problem. Each has mapped out plans for its remedy. The essential difference between their programs lies in whether the practice of surgery should be included in the province of the family physician.

I shall describe the program of the American Medical Association first.

In 1957, the House of Delegates recognized that there was a growing trend away from general practice. Convinced that family practice should be preserved, and that radical alterations must be made in the one-year rotating internship with optional residency training for family practice, the House then asked that a compre-

hensive study of the entire problem be made. The committee assigned to this task consisted of educators and family doctors, who went to work immediately. Representing the American Medical Colleges were Dr. Henry B. Mulholland, Dr. Rudolph Kampmeier, Dr. Clark Wescoe, Dr. Dean F. Smiley and Dr. John Youmans. The Council on Medical Education and Hospitals was represented by Dr. Herman G. Weiskotten, Dr. Leland S. McKittrick, Dr. Victor Johnson, Dr. James M. Faulkner, the late Dr. Edward L. Turner, Dr. Walter S. Wiggins, and Dr. Glen R. Shaphard, and the American Academy of General Practice by Dr. Jesse Rising, Dr. Malcolm Phelps, Dr. D. W. McKinley, Mr. Charles Nyberg, and myself.

This was a hard-working committee. Considering their work in retrospect, I am convinced that every member was sincerely devoted to the task of finding the answers to the problems of general practice. Few votes were held, but conclusions were arrived at after thorough discussion, by unanimous decision.

The committee first defined family practice as "That aspect of medical care performed by the Doctor of Medicine who assumes comprehensive and continuing responsibility for the patient and his family regardless of age." Note that the internist and the pediatrician do not quite qualify according to this definition, regardless of their training. After formulating this definition, the committee decided that preparation for family practice must include a strong background in internal medicine, including pediatrics, psychiatry and preventive medicine, broad experience with trauma and minor surgical procedures, and optional training in obstetrics. Also note that training in advanced obstetrics and major surgery is not included in the basic program. These stipulations, optional training in obstetrics and the deletion of training in major surgery and advanced obstetrics, were adopted by the committee only after prolonged deliberation.

*Rotating Internship and General Practice Residency.*—With its purposes thus defined, the committee directed its attention to currently available programs of preparation for family practice in an attempt to determine the cause for the diminishing numbers of entrants into this field. The observations of the committee, clearly stated in its report, are that the rotating internship is inadequate and too many general practitioners enter practice after this short period of training, and that the residency program for general practice is not sufficiently coordinated with the rotating internship or not sufficiently challenging to attract trainees in numbers sufficient to fill the need for family physicians. There is something wrong with general practice as a mode of administering medical care, with the rotating internship, or with the content of the residency program. Either the training program is not properly coordinated or attempts to cover too much ground; it may be poorly integrated into the hospital teaching program or fail to give the trainee increased responsibility in keeping with his experience. At any rate, fewer and fewer trainees are entering general practice and more and more are entering specialties, despite the pronouncements of the American Medical Association. The committee was unanimous in its declaration that the one-year rotating internship does not today, and certainly will not in the future, constitute adequate training for family practice. A program to replace it, therefore, was immediately taken under consideration.

The members of the committee were all vitally interested in medical education. They were all competent physicians, but, like all good doctors, they sought consul-

tation for diagnosis and therapy of a complicated condition.

The consultants came and proffered expert advice. They represented the following groups: The Committee on Residency Review for General Practice (a joint committee of the American Medical Association and the American Academy of General Practice), The American College of Physicians, The American College of Surgeons, The American Board of Surgery, The American College of Obstetricians and Gynecologists, The American Board of Obstetrics and Gynecology, The American Psychiatric Association, The American Board of Psychiatry and Neurology and the American Hospital Association.

Many divergent views were expressed by these consultants. Various questions were raised: Should obstetrics be mandatory in training for family practice? Is time spent in major surgical training valuable, or could it be better spent in medicine and pediatrics rather than on the end of a retractor, assisting in a procedure the trainee would never use without long additional training? Can the family physician be prepared to practice on a level comparable with that of the internist and the pediatrician when time must be allocated to the study of trauma, otolaryngology, obstetrics and gynecology? In short, to what fields should the trainee devote the major portion of his training period to qualify him as a good family physician?

Deliberations continued from January 1957 to June 1959. This is two and one-half years. The question constantly before the committee was: In view of the rapid advance of specialization and the choice by trainees of specialty training over general practice, with the constantly increasing urbanization of the United States and its constantly increasing rapidity of transportation, with specialized care increasingly available to a steadily growing segment of the population, with the constant improvement in standards of practice and the resultant definition of hospital privileges in terms of specialty-trained staff members, what type of training program must be devised to enable the general practitioner to compete with board-certified specialists in the four fields constituting general practice—medicine, pediatrics, obstetrics and surgery?

With this question always before them, and in full recognition of the fact that during the past decade the number of specialists in the United States has increased 60 per cent while the number of general practitioners has decreased, the committee concluded that, unless an answer is found, the family physician of the future will be a specialist who, although he may be superbly trained in his specialty, will not be specifically trained for family practice.

The committee therefore sought and heard testimony, formulated programs of training, revised them and re-revised them, and finally submitted its report. This two-year basic program of training for family practice I should like to outline for you, since in my opinion it offers many advantages over those included in the present training provisions for general practice:

1. The basic, minimal program must be accorded two years instead of one.

2. This program must have continuity. The break-off point now existing at the end of the first year should be eliminated.

3. The program must be planned as a whole rather than relying on the hope that the second year will be properly coordinated with the first.

4. Emphasis must be placed upon the trainee's comprehensive and continuing responsibility for the patient throughout the hospital experience, rather than upon the episodic experience necessitated by rapid rotation from one service to another

according to the rotating internship pattern in current use.

5. Of the basic, minimal two-year training period, the first eighteen months must be spent in medicine and its branches, including pediatrics. As the committee stated, "Eighteen months should provide experience, in a very broad sense, in the diagnostic, therapeutic, psychiatric, preventive and rehabilitative aspects of medicine and pediatrics, and include care of the newborn."

Another quote from the report indicates the intentions of the committee: "The two-year graduate program in preparation for family practice should be planned and implemented as a unified whole. As the family physician is to provide continuing care, it is highly important that preparation for this kind of practice be designed to assure the participant of suitable opportunities to study patients over relatively long periods. He should follow the patient as necessary in the outpatient service, into the home when this is practicable, and certainly from one hospital service to another—for example, from the medical or pediatric service through the surgical wards. There should be maximum continuity of assignment in specific services so that education through continuing rather than episodic medical experience would be stressed. Such a unified two-year program would permit and encourage the necessary progression of responsibility.

The committee was fully cognizant of the organizational difficulties involved in effecting such continuity, but believed that they could and should be overcome.

So much for the general characteristics of the new plan, and the first eighteen months of medical training.

*Obstetrics.*—What, then, of obstetrical training? The committee recognized that the great majority of family physicians will, in the future, and certainly in the immediate future, probably practice obstetrics. The trend in the most populous areas is debatable. To provide for those family physicians who plan to include obstetrics in their practices, as well as for those who do not, this stipulation was made, "The opportunity for training in obstetrics during the elective period of six months' duration should be a requisite of all programs." Moreover, should the trainee select obstetrical training, he must be accorded four months of such training. If he so elects, he may spend the remaining two months in medicine, pediatrics, otolaryngology, the outpatient department and the emergency service, or in additional obstetrical and gynecological training. Office treatment of gynecologic patients and the care of the newborn are also required in this program. The question of whether obstetrical training for family practice should be optional or compulsory is still "hot." Certainly this program, which provides for optional training, should be scrutinized carefully.

The last six months of the two-year program thus provide an elasticity that permits adjustment of training to the desire of the trainee.

*Ambulatory Care, Emergency Service and Surgery.*—In this program, the opportunity of the trainee to examine the patient on his initial visit to the hospital in the outpatient or emergency department is stressed. Training in the treatment of the ambulatory patient is considered an essential part of the program.

Regular assignments, throughout the two-year training period to the emergency service, and an increase of responsibility according to experience are among the essentials of this plan. It is here that the student should receive his training in minor surgery as well as in medical emergencies in the departments of general practice, surgery, medicine, orthopedic surgery, pediatrics, and plastic surgery.

*Advanced Obstetrics and Major Surgery.*—Because of the advances made in obstetrics and major surgery within the past decade, most family physicians are happy to have specialists in these fields available. Many family physicians, however, still perform major operations today. There is great variation in this practice, which is subject to custom, geography and the accessibility of surgical specialists. In some areas, less than 5 per cent of family physicians perform major operations, while in other areas the figure approaches 100 per cent.

The committee carefully weighed all these facts and figures and concluded that, regardless of present practices, the trends in medical practice as projected into the future indicate that the family physician is destined to perform fewer and fewer major operations and complicated obstetrical procedures, but will be expected to be more and more proficient with internal medicine and its branches, including pediatrics, geriatrics and the primary management of trauma. In fact, the family physician's hospital privileges may well depend upon his proficiency in these branches of medical practice.

As custom and location, however, militate against rigidly drawn limitations in the field of family practice, the committee stipulated that training in major obstetrics and major surgery should be made available to the family physician, stating that "Physicians planning to undertake other than uncomplicated obstetrical procedures should take additional advanced training in this field. Participants in this program who plan to practice major surgery are expected to take additional advanced training."

In this program, just as in the general practice residency program now in use, the need for advanced training for advanced procedures is recognized.

The American Academy of General Practice agrees that hospital privileges, including surgical privileges, should be granted in accordance with demonstrated ability, but asks that training in obstetrics be compulsory rather than optional, and that surgical training be included in the two-year training program. The organization is prepared to sponsor such programs in qualifying hospitals. The Academy bases its policy on its belief that the family physician should be qualified by training to perform emergency surgical procedures in areas where board-certified surgeons are not accessible, and that the traditional method of developing surgical skill through preceptorship, a policy frowned upon by the American College of Surgeons, is a valid one.

It should be recognized that the family physician working in sparsely populated areas faces problems vastly more complicated than those confronting the family physician in Chicago, and that he must be trained for them. There certainly is a place for both types of training program. The Academy also points out that although the new program of the American Medical Association may prove the ideal one for the family physician of the future, the needs of the family physician of today must be met by provision for training in both obstetrics and surgery. The point is well taken.

To recapitulate, however, the program of the American Medical Association provides a two-year minimum training program and is a vast improvement over the one-year rotating internship plus an optional general practice residency of one year. It is better correlated, better balanced, and better adapted to the needs of the family physician of the future, who will have to demonstrate his proficiency primarily in medicine if he is to be regarded as a well-qualified family physician; internists are now, in many areas, rapidly supplanting general practitioners. The program provides training in pediatrics,

minor surgery, the treatment of trauma and the office treatment of otolaryngologic and gynecologic patients. It provides for optional training in obstetrics within the two-year span, and for further training in surgery if desired. The program is designed to raise standards for family practice, and I believe that it will do just that.

One closing observation may be in order. I believe this is the first time in the history of American medicine that designated representatives from the medical schools, general practice and the American Medical Association have ever sat around a table at intervals over a period of more than two years and made an attempt to discover solutions for the educational problems encountered in one of those fields, general practice. The very gesture is salutory. Few of the problems faced by any of us are impossible to solve when men of good will face each other, state and resolve their differences and strive for a common goal. It is to be hoped that the dividends, in the form of better medical care for the American people, will be realized during the coming years. Attainment of this goal will, to a large degree, depend on the favorable reception and wholehearted support of this program by leaders in the field of medical education and by the dynamic persons working actively on hospital staffs throughout the country.

## IV. The Cost

DOMINICK F. MAURILLO, A.B., M.D., LL.D., D.Sc.*

NEW YORK, NEW YORK

DURING the past thirteen years, I have been trying my best to prove to medical educators that there really is a shortage of doctors in the United States and that something must be done about it.

The Board of Regents of New York State has accepted one important suggestion. They have approved medical education given in Italy, Switzerland, France, Holland, Belgium and Ireland. Now 400 to 500 American doctors are being graduated every year from the institutions in those countries. I was the chairman of each of the committees which conducted the study of European medical education and made the recommendations to the Board of Regents.

On May 8, 1956, I addressed the 150th annual meeting of the New York State Medical Society, emphasizing the critical need for more doctors. The *New York Times*, in an excellent editorial on the following day, quoted important parts of my speech and conclusions.

Congressman Francis E. Dorn of Brooklyn, New York, presented to his fellow congressmen the entire *New York Times* editorial and a résumé of my speech. This was repeated in the United States Senate and recorded in the *Congressional Record.*

On May 29, 1956, Congressman Dorn introduced a bill, H. R. 11518, which incorporated all of my conclusions, with particular emphasis on the suggestion that an impartial disinterested Congressional Committee be appointed to study the reasons for the shortage of doctors in the United States. This bill has been pigeonholed every year since its introduction, as a result of the action of lobbyists.

On March 28, 1957, I delivered a major address on the same subject before the New York State Board of Regents. Copies

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were sent to all the deans of medical colleges in New York, to all college and university presidents, to all assemblymen and senators, and to the Congressmen and the two Senators from New York State. In that speech I stated also that specialization was getting out of control and that 80 per cent or more of the graduates of medical colleges wanted to specialize. I then suggested that all specialty education should be controlled by the medical colleges, and that a Ph.D. should be awarded to each specialist.

In July 1959 I was summoned to Washington to testify in connection with a bill concerning the grant of $50,000,000 per year for international health research. My talk alerted the Congressmen to the peril to national health caused by the shortage of doctors, and they were urged to amend the bill by adding $50,000,000, annually, for medical education. This bill was kept in committee, with no chance of passing.

The need for more physicians is common knowledge today. Even the A.M.A. and the deans of the medical colleges admit that our country needs more doctors on medical faculties, more researchers, more full-time doctors for independent hospital centers, more doctors for public health and mental hospitals and for industrial clinics, more interns and residents, and—most important—more general practitioners for our 180,000,000 people. A conservative estimate of the shortage of doctors would be 35,000, and this could easily be stretched to 50,000. Now let us look at the reasons for this critical shortage. Many experts concede that the United States had enough doctors in 1935 for its 125,000,000 people. One must bear in mind that 75 per cent of the total number of doctors were in general practice at that time. Today the percentage of doctors in general practice is less than 30.

In 1935, 77 medical colleges graduated 5,183 doctors; in 1950, 79 medical colleges graduated 6,135 doctors; in 1955, 82 medical colleges graduated 6,845 doctors, and in 1960, 85 medical colleges graduated 7,081 doctors. I mention these figures to show that in a period of twenty-five years—and even with the addition of eight new medical colleges—there was an increase of only 27 per cent, of fewer than 1,900 doctors. This small, inadequate increase does not compensate for the more than 3,500 doctors who die each year.

In 1935 the medical colleges and other agencies doing medical research spent about $1,000,000; in 1960, approximately $730,000,000. The last-mentioned sum—$730,000,000—is more than the total amount of money spent for medical research in all the rest of the world.

The Federal Government gave the following amounts to medical colleges in 1960: Harvard, $7,130,919; Columbia, $4,427,285; New York University, $4,772,755; University of Michigan, $4,025,157, and the two New York State Medical Colleges, $2,069,087. Every medical college in the United States received upward of $500,000 in 1960.

The figures are not available, but I doubt that the entire cost of undergraduate medical education in the 85 medical colleges is more than $125,000,000 a year.

*Should* there be such a great discrepancy —$730,000,000 for medical research versus $125,000,000 for medical education? I am not opposed to research work, for I am convinced that it is absolutely necessary in this highly competitive world, but let us be reasonable! We should not spend such a large amount for research without first producing more doctors. Let us not put the cart before the horse! If we want to get full value for the money spent, we should have researchers who are really dedicated to their work.

Recently we have been reading in the daily newspapers that there are not enough college graduates available for entry into medical schools. Here is the

record on this score. Last year, the 85 medical colleges selected about 8,100 from a list of more than 15,000 who had been recommended by the premedical faculty committee in each of the colleges and universities in the United States. All these students had been screened during each year of their college work, and only those with the highest averages were recommended. If the medical colleges want more students, why don't they take more women students? Why this discrimination? Why do women constitute only 5 per cent of the total number of medical students? It is not that way in other countries: 50 per cent or more of the doctors in Russia are women. Why are more than 2,300 Americans studying medicine in foreign countries? In my opinion, the medical colleges should be grateful for the fact that they have a fine selection of students to choose from. I am absolutely sure that more students would want to become doctors if some of the existing barriers were removed.

Russia, with its 68 medical colleges, graduates more than 14,000 doctors a year. In 1960, 1,000 doctors were graduated from the Medical College of the University of Paris. This is about one-seventh of the total number of doctors who were graduated from the 85 medical colleges in the United States during that same year. Let me emphasize this point: these graduates from the University of Paris are well-trained doctors. They are ready to practice immediately after graduation, without internship or further training, and I would trust any one of them to do a good job in general practice in any country in the world.

The Japanese tried our system of medical education. They built 80 medical colleges of an average capacity similar to ours. They have learned their lesson. Today they have centralized and have only 44 colleges, and they expect to have only 40 by 1965. Their doctors are better trained today in the larger medical centers. Why? Because the cost of maintaining and operating small medical centers is tremendously high.

What is the best way to combat this critical shortage of doctors in the United States? I suggest two practical solutions. My first plan is that Congress should pass a bill at this 1961 session which would incorporate the following provisions:

a. Allocation should be made to the 45 private medical colleges in the amount of $50,000,000 with no strings attached other than the guarantee to be mentioned hereafter. Beginning with the freshman class of 1962, and at a rate of $4,000 per student for each of four years, this money should be paid to the colleges for the undergraduate medical education of each additional student admitted beyond the total of the 1961 freshman enrollment. The colleges must guarantee the acceptance of 3,125 students above their 1961 enrollment, otherwise, the federal government would not grant any money for research. In this way, the colleges should produce 3,000 doctors by 1966.

b. Another $25,000,000 should be allocated to 41 state medical colleges on a matching plan basis; $2,000 of federal money for $2,000 of state money for each additional student admitted beyond the total of the 1961 freshman enrollment. Likewise, this should begin with the 1962 freshman class. As for the private colleges, no research money should be given unless additional students are accepted.

c. Ten million dollars should be allocated to scholarships on the basis of need, at a minimum of $300 and a maximum of $1,500. This should increase the number of scholarships each year by 2,500.

d. A fund of $5,000,000 should be set up for aid to medical students. This fund would guarantee the payment of loans made to students by the banks of the United States and would pay 6 per cent interest on the loans for six years.

This bill will not cost more than $90,000,000 a year after 1966. In four years' time it will have produced 6,000 more doctors a year. The scholarship and student aid plans would stimulate college students to enter the profession of medicine. This bill could be financed by the money the federal government would save in not adding, until 1966, one dollar to the present allowance for medical research.

My second plan is that Congress should pass a bill at this 1961 session that incorporates the following points:

a. Fifty million dollars a year should be allocated to the 86 medical colleges for trimester undergraduate medical education in 1962. The best method of dividing the money among the colleges can be decided either upon the basis of student population, upon the size of the medical college or upon the number of doctors to be graduated. Such a plan was used during World War II and, to the best of my knowledge, was successful.

b. Ten million dollars should be allocated to scholarships, as in Plan 1.

c. Five million dollars should be allocated to student aid, as in Plan 1.

The number of doctors graduating with this plan in effect will depend on whether a new class is admitted each semester or only every other semester. I can assure you that the increase in the number of doctors would be greater than 50 per cent.

Now, what would be the cost of adding 30 medical college centers with the capacity to graduate 150 doctors yearly in each college—a total of 4,500 doctors? Capital costs would require $1,500,000,000, and between $150,000,000 and $300,000,000 per year would be needed for operating expenses. Is this not a tremendous and fantastic amount to pay for the education of 4,500 additional doctors a year? It would be eight years before the first doctor was graduated. Three thousand doctors will be needed to operate the thirty medical centers. By 1970, the population of the United States will be 210,000,000. Where are the doctors needed to take care of that population to come from?

My conclusion is that there is no need to study this problem further. We are in a state of emergency. Congress must act now, not next year. I firmly believe that the deans of the medical colleges will accept my first plan. At any rate either of the plans I have presented is more reasonable than is the contemplation of building thirty more medical college centers, and either would certainly be more acceptable to the taxpayers, on whom would fall the burden of so costly an enterprise.

## V. The Possibilities

RALPH SNYDER, M.D., F.I.C.S. (Hon.)

NEW YORK, NEW YORK

I SHALL not dwell at length on this state of national emergency—the shortage of physicians, which, if not already here, is rapidly becoming a very real crisis. Certainly there have been enough exhaustive reports from study groups and commissions to establish beyond any doubt that existing medical educational resources and patterns cannot meet the anticipated needs of the nation during the next decade. Perhaps the most disturbing

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fact is that, although knowledge and proof of this need have existed for several years, little action has been taken by responsible persons or groups to insure that this need will be met before our country's most important national resource, the health of its people, has been placed in serious jeopardy.

It is doubtful that, even if development of new medical colleges were begun today, they could be completed and producing well-educated physicians in sufficient numbers to meet the need before it became a serious crisis. This would be true even if there were enough faculty members for all the needed new schools and enough students to fill all the places.

I shall not attempt, in this brief space, to discuss the problems involved in the recruitment of medical students, although this aspect is of paramount importance. Other panel members will discuss this. I shall reluctantly be content to make the observation that the declining interest of students in the study of medicine is a real and complex problem, and will require a well planned, well directed, concerted effort on the part of all if a realistic solution is to be found.

Without doubt, new schools of medicine must be developed. There will be little opportunity for this needed development without strong, if not complete, support from the municipal, state and federal governments. The restrictions imposed upon individual economic development have virtually precluded the possibility of obtaining sufficient funds from private sources. The cost is so high—it has been estimated at well in excess of $20,000,000—that only aid from tax-supported sources is practicable. The development of schools having such sources of support must be based on equal opportunity for all, regardless of race, creed or color; particularly, they must be free of geographic restrictions and quotas. Preparation for the practice of medicine is an academic and educational process that can be served effectively only by selection based on ability rather than the fortunes of birth. Schools operating with such financial support must be free of political domination and interference, as they largely have been to date, with the responsibilities resting solely upon medical educators and administrators. Legislators at all levels must realize and accept their responsibility for the support of such new schools promptly and with vision and forthrightness.

New schools are not, however, the final answer. The cost is excessive, the time is short and the danger is too close. Existing educational facilities must bear increased burdens. Professional medical educators must accept the responsibility for meeting this problem. The patterns of medical education now in use must be critically evaluated and placed in their proper perspective. Certainly we must all recognize the great inadequacies that do exist.

During the past half century, medical education has undergone a more severe and rigorous development than has any other of the educational processes. After the publication of the now famous Flexner report, medical education assumed its proper and rightful title as education, rather than as vocational or trade school training. The inherent danger that exists today, not only for medical education but for all education, is that the threat of the sputnik age and its relentless competition will force a deterioration of education as we know it in the interest of producing a quick result. It is, indeed, very easy to produce a trained person, but there are few short cuts if the final result is to be an educated person. In my opinion, however, there are ways to meet the problem more effectively than we are now doing without destroying our educational system, which is one of the cornerstones of our way of life.

I have mentioned briefly the seemingly inescapable fact that new schools can be developed only with substantial or total financial support from taxes. Nevertheless, it would indeed be sad if we did not maintain our tradition of the medical school as a private, nongovernmental institution. Unfortunately, as the source of private financial support diminishes, the financial needs of privately endowed schools continue to increase. The disparity between income and expense steadily grows. Privately endowed schools must accept direct governmental aid. This, of course, is now a well-established practice, although the support is often given indirectly through research and training grants. Direct support must come, but responsible legislators must recognize their responsibility to protect the private educational system from restrictive controls. Governmental aid, though direct, must be unfettered and free. More than half of our medical schools are private, receiving no aid from taxes. Obtaining strong financial support for these schools is a real and practical way of meeting the problem.

Some private schools will be able to enlarge their classes if sufficient funds are made available for the construction of teaching facilities and the support of the faculty, but some schools need financial help even though they may not need to increase in size. There is a limit to the number of students that can be educated effectively. This is necessarily a variable and somewhat controversial figure, but it does exist.

The greatest bottleneck in medical education is at the all-important level of the first years in basic science. The opportunities for enlarging educational opportunities in clinical medicine are great, largely undeveloped and easily available. How, then, can the best advantage be taken of this fact?

There are many colleges and universities in the United States that do not have medical schools but do have strong and active science programs. With encouragement and financial support, many of these institutions could initiate programs that would prepare a student adequately in the basic medical sciences. This would rapidly supply a large number of students to fill the vacant places that now exist in the basic years of clinical study and make it possible to expand these areas. This, of course, is not a new idea. The two-year medical school has been in existence a long time. This is not the best educational method, but considering the strength of the academic orientation of a strong university, the danger to education, as compared with the danger to our nation's health in this crisis, would be minimal. This would also prepare the way for the gradual and orderly growth of new four-year schools at considerably less cost than that entailed in crash financing.

One of the real deterrents in getting a medical education is the long period of time between the beginning and the income-producing years. Many six-year plans have been discussed, and some have been initiated. The six-year medical curriculum following high school is not new; it is common in Europe, although it was discarded in this country decades ago as inadequate. In my opinion, it is educationally unsound to eliminate or reduce the basic, formative educational process upon which graduate education is built. A physician must have a broad education in fields other than science if he is to be more than merely a highly skilled technician or a vocationally trained person. Would it not be better to make it financially possible for a student to pursue a proper educational course than make that education minimal or narrow? If time is to be reduced, it can be reduced after the years in medical college are over by eliminating the internship and developing a logical, realistic postgraduate training program at

sensible residency levels. Space does not permit further development of this point, but I presented it in full in February at the meetings of the Council on Medical Education and Hospitals of the American Medical Association.

The current utilization of physical plants in medical schools is often inadequate. In what other successful enterprise are usable facilities allowed to remain unused for large parts of the year? And yet this is the situation, to a greater or lesser degree, in many institutions. It is indeed an expensive luxury. Effective utilization of physical plants could be very useful in meeting this emergency. It would mean, of course, double sessions or double classes, which could be maintained only if faculties were increased—they would not need to be doubled. There would also be a need for space for faculty offices and research and some added facilities to support larger number of students. These last, however, would be largely ancillary facilities, such as cafeterias, lounges and locker rooms. Granted, this procedure involves certain inherent dangers that could lead to deterioration of our educational system, but these dangers could be overcome with proper safeguards and controls.

Finally, the luxury of extended vacations is costly. Experience with the twelve-month year and the three-year curriculum has shown it to be satisfactory. Medical school is a graduate school. It is difficult, but all graduate education of high caliber is difficult. It is an adult experience and should be treated as such. A modest number of additional educators would be needed to reinforce the faculty of each school. The result would reduce by one year the length of time required for completion of studies and would increase the number of graduates by one-quarter.

These are some observations on ways to meet the educational problem. Each idea could be developed at length. There are undoubtedly many more. The need is great, the ways are many. None are easy, but many are possible and sound.

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Man, viewed morally, is a strange amalgam of angel and devil. He can feel the splendor of the night, the delicate beauty of spring flowers, the tender emotion of parental love, and the intoxication of intellectual understanding. In moments of insight visions come to him of how life should be lived and how men should order their dealings one with another. Universal love is an emotion which many have felt and which many more could feel if the world made it less difficult. This is one side of the picture. On the other side are cruelty, greed, indifference and overweening pride. Men, quite ordinary men, will compel children to look on while their mothers are raped. In pursuit of political aims men will submit their opponents to long years of unspeakable anguish.

—*Russell*

# An Appreciation of James Rudolph Jaeger, M.D., F.A.C.S., F.I.C.S.

D. J. LaFIA, M.D., B.S., F.I.C.S., D.A.B.

PHILADELPHIA, PENNSYLVANIA

RUDOLPH JAEGER is the last of a vanishing breed of self-made surgeons. He has lived during the period between the days of the pioneer neurosurgeon and those of the trained resident of today. Because he is representative of the end of an era in American surgery and neurosurgery, and because of his many practical contributions in the field of neurosurgery, an appreciation of the man and his work is most timely.

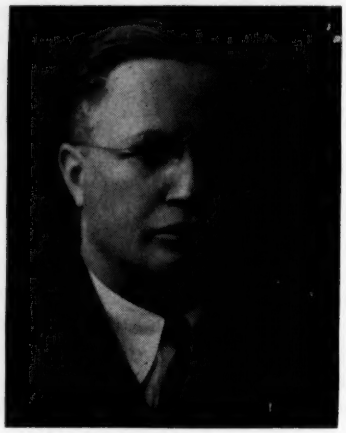
James Rudolph Jaeger was born in 1895 in Clarksville, Missouri, of German-American stock. In that same year another German, Roentgen, made one of the greatest scientific discoveries of all time. His discovery of roentgen rays subsequently revolutionized neurosurgery. Another native of Missouri, Dr. Walter E. Dandy (1886-1946), worked with roentgen rays and introduced ventriculographic and pneumoencephalographic testing technics. Drs. Dandy and Jaeger were good friends. But we are ahead of our story.

After his graduation in 1918 from the University of Missouri, Jaeger studied medicine at the University of Pennsylvania. Two of his teachers were Charles Frazier, a superb neurosurgeon, and J. B. Deaver, a master general surgeon. The young Jaeger admired the work of Frazier. Commenting on Frazier's skillful performance of retrogasserian neurectomy for tic douloureux he said, "each operation was a finished portrait."

After his graduation from the School of Medicine of the University of Pennsylvania, Rudolph Jaeger settled in Denver, Colorado. He became an apprentice to his uncle, Dr. Charles Jaeger, a general surgeon practicing in the Rocky Mountain area. Dr. Jaeger also taught anatomy and physiology at the University of Colorado Schools of Medicine and Dentistry.

Although the young man was well established in the field of general surgery by 1928, he apparently became dissatisfied and decided to specialize in neurosurgery. Training programs were practically unheard of at that time. Neurosurgeons were for the most part general surgeons who occasionally did a "brain case." But there were exceptions, such as Cushing in Boston, Frazier in Philadelphia, Dandy in Baltimore, Sachs in St. Louis and Adson at the Mayo Clinic. Even these men offered no formal training programs for would-be neurosurgeons. Trainees simply took a year or more of neurosurgical study in addition to their general surgical programs. Rudolph Jaeger was accepted as a postgraduate student by Dr. Walter Dandy of Johns Hopkins. During this appointment he was allowed to act only as an observer. He and Dr. Dandy became friends, however, and this cordial relation lasted till Dandy's death in 1946.

The year with Dandy (1928-1929) was a significant one for Dr. Jaeger. On his return to Denver he was inspired to new and intense activity. During the period between 1930 and 1943, Jaeger's innate mechanical ability flowered. Although he had little formal training in neurosurgery, he was able to introduce numerous practical innovations in technic.



Dr. Rudolf Jaeger

In 1943, he became Chairman of the Department of Neurological Surgery at Jefferson Medical College. During his eighteen years in this position, he developed the Department of Neurosurgery and trained many neurosurgeons who are now outstanding men in their communities. These men have made many contributions to the field of neurosurgery.

Jaeger's great appreciation of the effectiveness of a mechanical approach in neurosurgery seems apparent in all of his contributions. At a time when the specialty was still in its infancy, he realized that excessive reliance on neurologic examination was outdated. He perfected ventriculographic methods of testing and quickly saw the value of arteriographic examination. He was also interested in the use of contrast agents for study of the spinal canal. He performed experiments that aided in the development of oil compounds suitable for use in the subarachnoid space. He introduced and perfected procedures that allowed the surgeon to maintain continuous spinal drainage and thereby control intracranial pressure during craniotomy. This important procedure, an outstanding contribution, was described in a paper published in the *Journal of the International College of Surgeons* in 1955.

Jaeger employed a bold approach to intracranial aneurysms. In his impressive report of a series of more than 250 patients, personally operated on for aneurysm, he cited a lower rate of mortality than is usual in a series of patients undergoing this type of operation. In performing his operations for aneurysm, Jaeger was extremely meticulous in his control of intracranial pressure in order to allow sufficient room for minute dissection. He also prepared his own gold clips for application to the aneurysms.

One of his recent contributions, and perhaps his greatest, concerned the treatment of trigeminal neuralgia. His interest in trigeminal neuralgia was probably aroused during his medical school days, when he watched Dr. Frazier section the sensory root of the trigeminal nerve. In Denver, his teaching of anatomy in the dental school sustained his interest in the trigeminal nerve. Later, at Johns Hopkins, Walter Dandy taught him the posterior fossa approach to resection of the sensory root of the gasserian ganglion. By 1953 Dr. Jaeger had performed more than 200 such operations for trigeminal neuralgia with a mortality rate of only 1 per cent. This is an enviable record. Still, he was continually trying to simplify and improve safety precautions in the treatment of this disorder. In 1953 and 1954 he had been injecting boiling water into the frontal lobes as a modified method of prefrontal lobotomy. On the basis of this experience he decided to inject boiling water into the gasserian ganglion. He boldly took this step and perfected a method he has now used in more than 400 cases. This method has simplified the treatment of trigeminal neuralgia. It consists of injecting into the gasserian ganglion, under roentgenographic control, 0.5 cc. of boiling water. Anesthetization of the trigeminal

area is prompt, effective and lasting. No deaths have occurred in this series, and no instance of facial paralysis in cases of trigeminal neuralgia has been reported.

I should like to add a few words about Rudolph Jaeger as a man. On the surface he appears to be cold and distant, but beneath this exterior is much charm and kindness. Many neurosurgeons, during the early period of our specialty, perhaps affected the cold exterior appearance to mask their anxiety in those days when the field of neurosurgery was young and demanded such daring. Jaeger has never been a flamboyant person. He has always done things in a quiet but thorough and charitable way. He has many admirers, and the men he trained are grateful for his teaching, especially as that teaching was by example rather than by precept. His hobbies include cinematography, and his surgical motion pictures have won him many awards. He has been a devoted husband, father and grandfather.

He has published more than 50 articles, and it is hoped that in the near future he will publish a monograph on the treatment of trigeminal neuralgia. Among many honors that have been given him is the distinction of having been President of the United States Chapter of the International College of Surgeons in 1944.

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The Peripatetics represented dreams as arising from a presaging faculty of the mind; other sects imagined that they were suggestions of dæmons. Democritus and Lucretius looked upon them as spectres and *simulacra* of corporeal things, emitted from them, floating in the air, and assailing the soul. A modern writer, Andrew Baxter, entertained a notion somewhat similar, and imagined that dreams were prompted by separate immaterial beings, or spirits, who had access to the sleeper's brain with the faculty of inspiring him with various ideas. Burton divides dreams into natural, divine, and dæmoniacal; and he defines sleep, after Scaliger, as "the rest or binding of the outward senses, and of the common sense, for the preservation of body and soul."

Gradually released from the trammels of superstition, modern philosophers have sought for more plausible explanations of the nature and causes of dreams, but perhaps without having attained a greater degree of certainty in this difficult question than our bewildered ancestors. Wolfius is of opinion that every dream originates in some sensation, yet the independent energies of the mind are sufficiently displayed in the preservation of the continued phantasms of the imagination. He maintains that none of these phantasms can prevail unless they arise from this previous sensation. De Formey is of the same opinion, and conceives that dreams are supernatural when not produced by these sensations. But of what nature are these sensations? Are they corporeal impressions received prior to sleep, and the continuances of reflection, or are they the children of an idle brain?

—*Millingen* (circa 1837)

# New Books

## BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

**Local Anesthesia and Pain Control in Dental Practice.** By L. M. Monheim. St. Louis: The C. V. Mosby Company, 1961. Pp. 319, with 148 illustrations. *Reviewed in this issue.*

**Abdominal Operations.** By Rodney Maingot. New York: Appleton-Century-Crofts, Inc., 1961. 4th ed. Pp. 1,440, with 1,883 illustrations. *Reviewed in this issue.*

**Preventive Medicine in World War II: Communicable Diseases Transmitted by Contact or by Unknown Means.** Edited by E. C. Hoff, with a foreword by the Surgeon General and chapters by 27 contributors. Washington, D.C.: the U.S. Government Printing office, 1961. Vol. 5. Pp. 530, with 74 illustrations, 55 tables, 18 appendix tables, 12 charts and 4 maps. *Reviewed in this issue.*

**Glaucoma: Chemistry, Mechanisms and Therapy.** By S. Lerman. Springfield: Charles C Thomas, Publisher, 1961. Pp. 98, with 25 illustrations. *Reviewed in this issue.*

**Stedman's Medical Dictionary.** Baltimore: The Williams & Wilkins Company, 1961. 20th ed. Pp. 1,680, with 32 plates and illustrations. *Reviewed in this issue.*

**Les Cavités Cardiaques: Introduction Anatomique a la Chirurgie Intracardiaque (The Chambers of the Heart: An Anatomic Introduction to Intracardiac Surgery).** By E. Henry, R. Courbier and P. Rochu, with a preface by R. de Venrijoul. Paris: Masson et Cie., 1960. Pp. 176, with 196 illustrations.

**Practical Clinical Management of Electrolyte Disorders.** By William J. Grace. New York: Appleton-Century-Crofts, Inc., 1960. Pp. 132, with 10 tables and 8 illustrations.

**A Clinical Prospect of the Cancer Problem** (Introductory volume of **Monographs on Neoplastic Disease at Various Sites).** By D. W. Smithers. Baltimore: The Williams and Wilkins Company, 1960. Pp. 232, with 46 illustrations and 10 tables.

**Thymectomy for Myasthenia Gravis.** By Henry R. Viets and Robert S. Schwab. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 130, with 32 illustrations.

**Experiences with Congenital Biliary Atresia.** By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

**The Femoral Neck—Function, Fracture Mechanism, Internal Fixation: An Experimental Study.** By Victor H. Frankel, Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 119, with 58 illustrations.

**Congenital Malformations: A Ciba Foundation Symposium.** Edited by G. E. W. Wolstenholme and C. M. O'Connor. Boston: Little, Brown and Company, 1960. Pp. 308, with 91 illustrations.

**General Anesthesia for Neurosurgery.** By Robert I. W. Ballantine. Boston: Little, Brown and Company, 1960. Pp. 152, with 68 illustrations.

**Experiences with Congenital Biliary Atresia.** By Julian A. Sterling. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 68, with 21 illustrations.

**Calcium Metabolism and the Bone.** By Paul Fourman. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 325, with 7 illustrations.

**Chemical Osteosynthesis in Orthopaedic Surgery.** By Michael P. Mandarino. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 72, with 36 illustrations.

# BOOKS REVIEWED

**Abdominal Operations.** By Rodney Maingot. New York: Appleton-Century-Crofts, Inc., 1961. 4th ed. Pp. 1,440, with 1,883 illustrations.

The third edition of *Abdominal Operations* appeared in 1955. It has occupied a prominent place in this reviewer's library ever since. This fourth edition is a worthy successor, for the work has been thoroughly revised and entirely reset, with the addition of many new chapters, plus the introduction of 917 new illustrations. These illustrations depict beautifully the essential steps in operative procedures. Rodney Maingot has the ability to tell a complicated story in such a fashion as to make it both understandable and interesting.

Although this book is entitled *Abdominal Operations*, it includes much more than this. The reader will be pleased to find not only the technic of a specific operation but the choice of procedures and the difficulties and dangers that may arise during the operation. Preoperative and postoperative care, as well as the management of complications, are also discussed in this all-inclusive book.

For the first time, Mr. Maingot has asked specialists in the field to contribute to the text. One finds chapters by thirty-six authors, both British and American, and reads with delight the work of Alexander Brunschwig, Warren Cole, Waltman Walters and many others, as well as such world-renowned English surgeons as Sir Cecil Wakeley, Norman Tanner and Sir Zachary Cope. Many of these authorities present their material for the first time, thus bringing the book up to date.

The illustrations must come in for special commendation, as all irrelevant material has been deleted and only essentials included.

In his preface Mr. Maingot states that the work was intended "to present a detailed account of abdominal operations as practised today." This intention has surely been accomplished most astutely.

The book can be recommended wholeheartedly to both undergraduates and postgraduates who are interested in abdominal surgery.

PHILIP THOREK, M.D.

**Glaucoma: Chemistry, Mechanisms and Therapy. By S. Lerman.** Springfield: Charles C Thomas, Publisher, 1961. Pp. 98, with 25 illustrations.

This monograph mentions briefly many aspects of glaucoma. No attempt could be made to detail the massive accumulation of literature available on this subject. The author describes his treatments for the different types of glaucoma. These treatments are, for the most part, orthodox. The book is well indexed and contains an authoritative bibliography.

ORVILLE E. GORDON, M.D.

**Local Anesthesia and Pain Control in Dental Practice.** By L. M. Monheim. St. Louis: The C. V. Mosby Company, 1961. Pp. 319, with 148 illustrations.

In this book there are chapters dealing with the armamentarium, sterilization and the postoperative control of pain. In the last-mentioned chapter various drugs are described briefly and chemical formulae are given. A good list of drugs, including the purposes for which they are used, and a list of preanesthetic medications are included. Hypoalgesia is discussed.

Anesthetics that may be used in various circumstances, as well as vasoconstrictors are described. The chapter in which anesthetic complications and office emergencies are discussed is an important one, for these subjects are often overlooked. The description of local anesthetics and anesthetic solutions is informative and valuable. The discussion of technics of regional anesthesia and analgesia may not be especially new to dentists, but it is a necessary part of such a book as this. The medicolegal aspects of regional analgesia are also considered.

An extensive and interesting description of the trigeminal nerve and its branches is well worth reading.

The value of the author who can limit his discussion to one phase of a subject is demonstrated in this book. When there has been no attempt to make the material all-inclusive, emphasis can be placed where it is required.

This book has an index, a small appendix and a short glossary, which enhance its value to the reader and help him to become familiar with the terms employed.

JOHN S. LUNDY, M.D.

**Stedman's Medical Dictionary.** Baltimore: The Williams & Wilkins Company, 1961. 20th ed. Pp. 1,680, with 32 plates and illustrations.

The twentieth edition of Stedman's marks the fiftieth year of its existence and is subtitled "Golden Jubilee Edition." This printing has been extensively revised, with the aid of a large board of consulting editors and help from the dental and pharmacologic fields. Thousands of new definitions have been written and thousands of new entries inserted. Particular attention has been given to an enlargement of dental terms, which widens the scope and use of the dictionary. Many tables and profuse illustrations are included. One finds concise biographies of the medical "greats." The appendix is replete with information on weights and measures, symbols, comparative temperature scales, chemical elements with their symbols, atomic numbers and atomic weights. To the medical writer the section on etymology is fascinating. This dictionary is highly recommended.

PHILIP THOREK, M.D.

**Preventive Medicine in World War II: Communicable Diseases Transmitted by Contact or by Unknown Means.** Edited by E. C. Hoff, with a foreword by the Surgeon General and chapters by 27 contributors. Washington, D.C.: the U.S. Government Printing office, 1961. Vol. 5. Pp. 530, with 74 illustrations, 55 tables, 18 appendix tables, 12 charts and 4 maps.

This volume, the second dealing with communicable diseases, fourth in the preventive medicine series and sixteenth in the total series dealing with the medical history of World War II has chapters on actinomycosis, epidemic keratoconjunctivitis, hookworm, leprosy, leptospirosis, schistosomiasis, cutaneous infections, impetigo, scabies, trachoma and tularemia. One hundred and eighty pages of the book deal with the problem of controlling venereal disease in all theaters of operation; this is followed by a consideration of yaws, Bullis fever, infectious mononucleosis, etc. The book is well prepared, thorough and easy to read. For those interested in the historical aspects of preventive medicine it is a valuable book, written by those whose knowledge of the subject and era is the result of direct experience.

WARNER F. BOWERS, M.D.

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It is by teaching that we teach ourselves, by relating that we observe, by affirming that we examine, by showing that we look, by writing that we think, by pumping that we draw water into the well.

—*Amiel*

# Abstracts from Current Literature

**The Surgical Management of Retinal Detachment.** Birge, H. L., Surg., Gynec. & Obst. 111:205, 1960.

The factors that contribute to the development of retinal detachment are reviewed, as are the various forms of current surgical treatment.

Retinopexy, vitreous implant, scleral buckling and resection, light coagulation and prophylactic retinal operation are all concisely examined by the author.

As a criterion for considering a procedure to correct retinal detachment "successful," Dr. Birge suggests "the reestablishment of binocular vision of 20/20 to 20/40 with a usable visual field." He states that, as this is the criterion for success in an operation for cataract, it should also apply to operation for retinal detachment.

Although one must be somewhat arbitrary in establishing the criteria by which one judges the success of operations for retinal detachment, the author's specifications are patently unrealistic.

Detachment of the macula in an elderly person is a surgical emergency and requires immediate correction. Unfortunately, a large number of patients may delay in seeking medical attention for days or even weeks. Successful reattachment of the retina in this and similar instances seldom results in better than 20/50 vision. One might, however, ask such patients whether the correction of their vision to 20/50 represents a success. I venture to say that the answer would be a resounding "Yes!"

The author reviews some of the factors that may affect the retinal surgeon's rate of success, and offers excellent suggestions concerning the extended postoperative follow-up.

ROBERT F. AZAR, M.D.

**Primary Repair of Flexor Tendons.** Verdan, C. E., J. Bone & Joint Surg. 42-A:637, 1960.

Of the problems still to be solved in surgical treatment of the hand, repair of the flexor tendons in the digital sheath is the least worrisome. Repair of this traumatic lesion offers a problem for which many solutions have been advanced by many capable specialists. The author outlines his experience with the repair of this defect on the basis of his use of primary suturing in 19 cases and/or his subsequent performance of 60 tendon grafts. In his opinion, the dictum advanced by specialists that "grafts should be performed in preference to primary repair of tendons cut in Bunnel's no-man's land" is too rigorous. Delayed grafting of the tendon is justified only when the surgeon has no experience with surgery of the hand, or when general or local conditions are not favorable to immediate repair. For clean, fresh wounds, specialists capable of performing tendon grafts correctly are *a fortiori* qualified to do surgical suturing. The author prefers a technic that consists of excising the sublimis, suturing the profundus accurately with fine epitendonous stitches, resecting the sheath in the region of the repair and immobilizing the ends of the tendon with two transversely placed stainless steel pins to prevent tension on the delicate suture line. Should healing hinder gliding, the author states that a secondary tenolysis will produce functional results, often better than those attained by employing tendon grafts. For multiple simultaneous lacerations of the flexor tendon in several of the digits, primary repair, in the opinion of the author, is even more fully justified than when used to correct a tendon laceration in one digit.

CHARLES M. SWINDLER, M.D.

**Diagnosis of Kidney Cancer.*** Evans, J. A., Halpern, M., and Finby, N., 175:201, 1961.

Observations on 100 patients with primary renal carcinoma and Wilms tumor are reported. A case of carcinoma of the kidney is observed at the New York Hospital, Cornell Medical Center for every 10 patients with carcinoma of the lung and for every 4 patients with carcinoma of the stomach.

One-third of the authors' series had no signs or symptoms pointing to the possibility of renal disease. Ninety-seven patients had hypernephroma. There were 65 men and 35 women, most of them between the ages of 41 and 70. Hematuria, pain and a mass were observed in only 15 per cent. Hematuria was present in 58 per cent; pain, in only 20 per cent. A mass was detected in only 15 per cent. Two of the patients had polycythemia, which disappeared after nephrectomy. Unexplained polycythemia may be a clue to renal carcinoma. The Papanicolau test of the urine was not helpful; it gave negative results in 55 cases. Roentgenographic differentiation between renal cyst and neoplasm can be made by renal arteriographic or nephrotomographic study. The latter was used in this series.

WALTER EDKINS. M.D.

**Traumatic Avulsion of the Insertion of Flexor Digitorum Profundus.** Gunter, G. S., Australian & New Zealand J. Surg. 30:1, 1960.

It is the intention of this paper to draw attention to a type of injury of the hand, hitherto undescribed, which is uncommon and of particular significance wherever football with Australian rules is played. Every season produces a few patients who have avulsed the flexor digatorum profundus tendon of the ring finger from its point of insertion. Because of its rarity, there is a general unawareness of the condition, leading to a delay in its diagnosis that consequently has a bearing on the effectiveness of treatment. A description of the cause of the condition, its clinical features and its varied management is outlined on the basis of 8 cases that have been observed and treated in recent years.

This injury occurs in the healthy young male and is most often associated with participation in sports. The typical clinical features of this condition undergo a progressive change with the passage of time after the injury. The symptoms are pain, swelling and stiffness, which are usually explained by the patient as a "sprain." Roentgen examination fails to disclose any fracture of the finger. A flexion deformity of the proximal interphalangeal joint becomes apparent some days after the injury, when the swelling, pain, and acute local inflammation have subsided. A careful examination will show that the tendon sheath over the middle phalanx is empty. Weeks or months after the injury was sustained and after the inflammatory reaction has subsided, physical examination discloses a flexon deformity of varying severity, occurring in most cases at the proximal interphalangeal joint: The optimum treatment is to repair the end of the tendon across the bare area at the base of the distal phalanx before the tendon is irretreviably shortened, provided the tendon can be found easily and provided the repair will not inhibit further action of the sublimus tendon. Experience has shown that such repair should be done within three weeks after the injury.

Early diagnosis is the key to success in the treatment of this condition. The main cause of delay in diagnosis seems to be a lack of awareness of the condition on the part of the patient and the failure of roentgen examination to show any fracture in the finger. If the diagnosis is made early enough, the simple procedure of reapposing the avulsed tendon to the bare area at the base of the distal phalanx can be performed without the necessity for performing either a tendon graft or an arthrodesis of the terminal interphalangeal joint.

CHARLES M. SWINDLER, M.D.

*At the request of Dr. Edkins, this abstract from our June issue is reprinted in order to correct an error in the opening paragraph.

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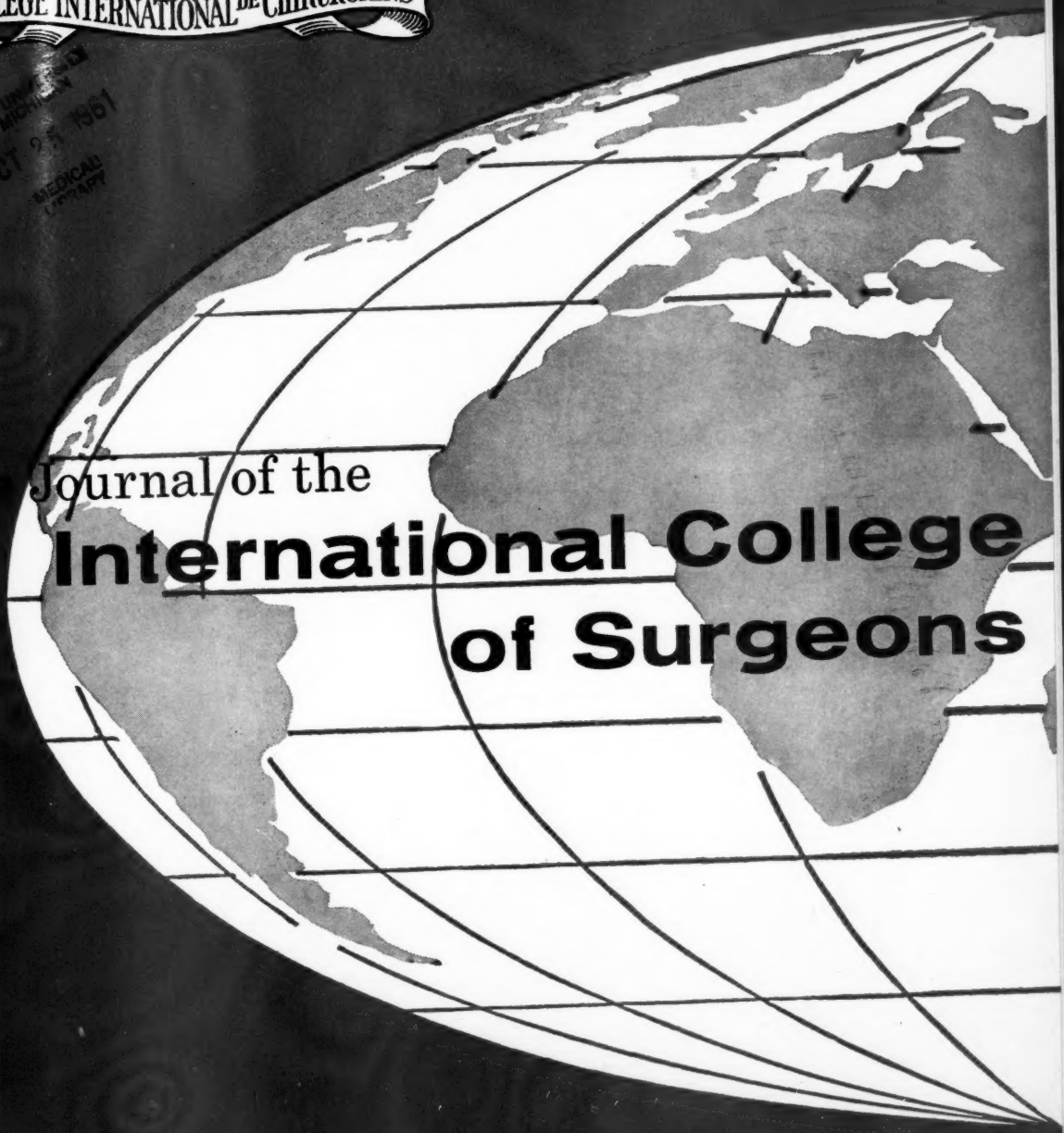

# The Journal of the International College of Surgeons

In Two Parts
Section 1
Vol. 36, No. 4

OCTOBER, 1961

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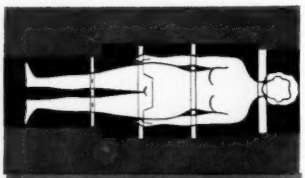

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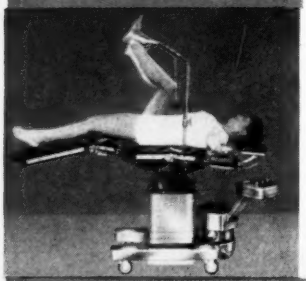

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